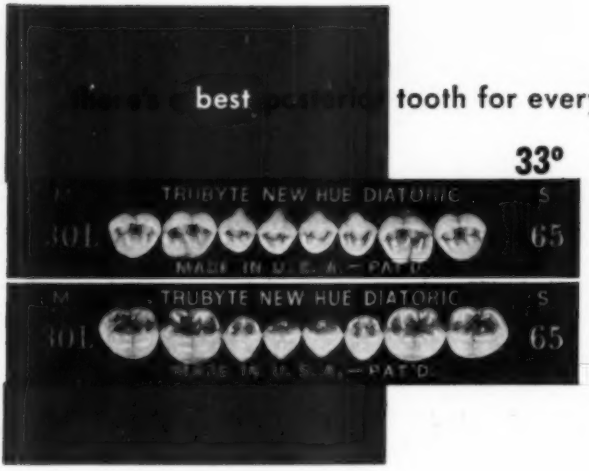
# THE Journal

JULY

1950

CONTENTS

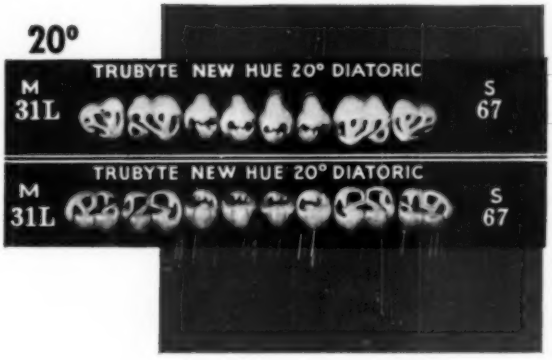

Dental effect of radioactive phosphorus—Burstone ..... 1
Dental roentgenography: voltage factor—Fitzgerald ..... 19
Distortion of wax patterns—Phillips ..... 28
Excessive citrus juice consumption—Hicks ..... 38
Age determinations on teeth—Gustafson ..... 45
Penicillin and N U 445 in tooth extraction—Rhoads ..... 55
Penicillin dentifrice and lactobacilli—Fitzgerald ..... 62
Full denture construction—Schuyler ..... 66
Cases and comments ..... 74
Editorials ..... 79
Washington news letter ..... 83
News of dentistry ..... 85
International correspondence ..... 101
Reports of councils ..... 102
The reader comments ..... 114
Current literature ..... 116
Book reviews ..... 122
Deaths ..... 126
Directory ..... 130
Announcements ..... 132

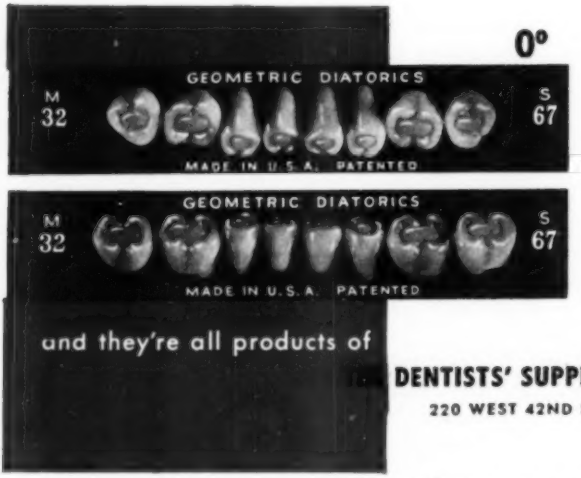



**Trubyte New Hue Posteriors**

Trubyte New Hue Posteriors have cuspal inclinations that are comparable to those of moderately worn natural teeth. Especially suited for partial and full dentures that oppose natural teeth, and for full denture cases in which individual condylar records have been made.

**Trubyte New Hue 20° Posteriors** are by far the most popular teeth for full denture work. Their low cuspal inclination minimizes lateral thrust. Their narrow occlusal contact minimizes pressure on the underlying ridge.




**Geometric Posteriors in Trubyte New Hue Shades**

For those dentists who prefer posterior teeth with no lateral cusp inclination, Geometric Posteriors are available. Designed by J. B. LaDue, D.D.S. and J. A. Saffir, D.D.S., Geometric Posteriors possess definite advantages over all other flat plane teeth.

**DENTISTS' SUPPLY COMPANY OF NEW YORK**

220 WEST 42ND STREET, NEW YORK 18, NEW YORK


The Journal of the American Dental Association, Vol. 41, No. 1. Published by the American Dental Association, 222 E. Superior St., Chicago 11, Ill. Yearly subscription $7.00 for U. S. and possessions; $8.00 for foreign countries. Single copy seventy-five cents. Entered as second-class matter, December 31, 1947, at the postoffice at Chicago, Ill., under the act of March 3, 1879. Published monthly. Copyright 1950 by the American Dental Association. The Journal of the American Dental Association is indexed in the Index to Dental Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

AND

# GOLD

## TO THE PATIENT IT IS A QUESTION OF—

"How does it look"
"Is it comfortable"
"How long will it last"
"What will it cost"

The important final adjustment of a gold partial can be made at the chair—without special equipment.

## YOUR THOUGHTS GO FAR BEYOND—

and in selecting a top-quality gold you can say with confidence that the gold partial is certain to function properly, be a source of comfort to the patient and a credit to a noble profession.

## DEE GOLD IS DEPENDABLE

OFFICE AND PLANT
1900 WEST KINZIE STREET..

HANDY & HARMAN
DEE GOLD
PRECIOUS METALS

REFINERS & MFRS.
..CHICAGO, 22, ILLINOIS

**DOWNTOWN OFFICE** **55 E. WASHINGTON ST.**

# DO YOU HAVE

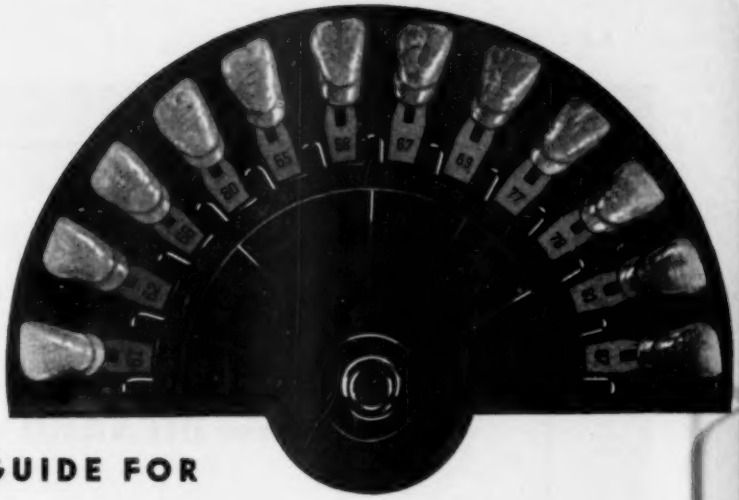
## ALL THE VALUABLE BOOKLETS AND CHARTS PUBLISHED BY THE DENTISTS' SUPPLY COMPANY OF NEW YORK?

A. Trubyte New Hue Mould Chart
B. Trubyte New Hue Articulation Chart (39)
C. Trubyte New Hue Vitality Scale Literature
D. 4 Easy Steps in the Selection of Teeth
E. Principles of Articulation
F. 20° Posterior Technic Book
G. New Solila Mould Chart
H. Trubyte New Hue Pin Pontics (Mould & Technic Book)
I. Trubridge New Hue Anterior & Posterior (Technic Book)
J. Trubridge New Hue Anterior & Posterior Mould Chart
K. House Articulator Booklet
L. New Simplex Articulator Booklet
M. Gysi Trubyte Articulator Booklet
N. Trubyte Checking Charts (1001 Practice Building Suggestions and Recall letters)
O. How to Build a Denture Practice

Please note on this coupon the booklets and charts in which you are interested. Paste the coupon on a penny postcard or insert it in an envelope and address it to

THE DENTISTS' SUPPLY COMPANY OF NEW YORK
220 WEST 42ND STREET NEW YORK 18, N.Y.

IS THERE
A SHADE
MISSING—
OR
DO YOU
REQUIRE
A COMPLETE GUIDE FOR



# TRUBYTE NEW HUE SHADES?

Remember the Trubyte New Hue Shade Guide is all you need for specifying natural shades in porcelain or plastic teeth.

Indicate on the coupon the shades that are missing from your Trubyte New Hue Shade Guide or your desire to have a complete Trubyte New Hue Shade Guide.

THE DENTISTS' SUPPLY COMPANY OF NEW
220 WEST 42ND STREET NEW

SEND ME THESE SHADES:

☐ A ☐ B ☐ C ☐ D ☐ E ☐ F
☐ H ☐ J ☐ K ☐ L ☐ M
☐ O

☐ Send me A Trubyte New Hue Shade Guide

SEND THESE SHADES FOR A TRUBYTE NEW HUE SHADE GUIDE:

☐ 61 ☐ 62 ☐ 63 ☐ 67 ☐ 77
☐ 66 ☐ 65 ☐ 69 ☐ 78 ☐ 87

Requested by _____

Address _____

City _____ State _____

*Accepted . . .*

*for use as a dentifrice*

**Pure Sodium BICARBONATE**

*U. S. P.*

**1. Reduces L. Acidophilus count** . . . recent research proves bicarbonate of soda an efficient dentifrice for L. Acidophilus control.

**2. Cleans Teeth Safely** . . . whitens teeth to original shade without harm to enamel. Freshens the mouth.

**3. Keeps instruments bright** . . . a few teaspoonfuls in the sterilizing water prevent tarnish. Instruments may be wiped bright even though kept in solution for hours. Costs but a few cents.

**4. Educational booklets** . . . a series of entertaining, illustrated little storybooks is available for your waiting room. They help keep youngsters cheerful. Sent free on request.

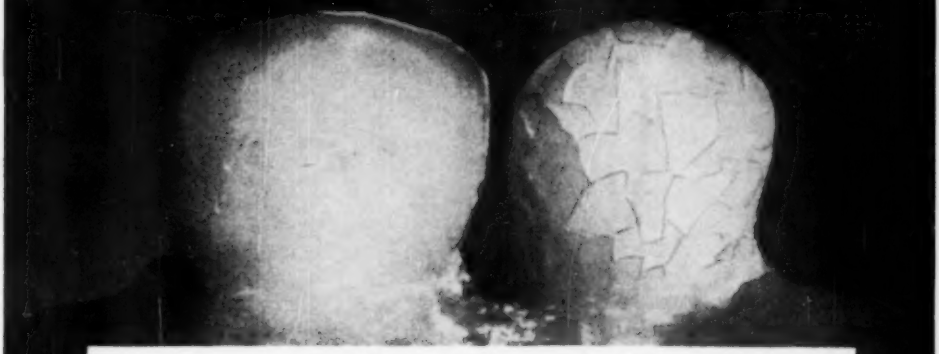
*Accepted*
COUNCIL on DENTAL THERAPEUTICS
AMERICAN DENTAL ASSOCIATION

**Business Established 1846**

**CHURCH & DWIGHT CO., Inc.**

**10 Cedar Street • New York 5, N. Y.**

# There is only one Real Non-Craze Plastic Tooth . . . DURA-BLEND



All methyl methacrylate teeth known to us will craze (above right) with repeated dippings in alcoholic beverages or common solvents*, after processing.

Such crazing accelerates wear, and stain absorption in the mouth. It is a major contributory cause of plastic tooth breakdown.

DURA-BLEND plastic teeth (left above) with their high safety factor are so resistant to crazing that out of millions of teeth and nearly two years of use, *not a single case has been reported.*

DURA-BLENDS will resist heats that puff other teeth into a sponge-like distortion.

Send for scientific booklet on testing plastic teeth

MYERSON'S Dura-Blend PLASTIC TEETH

MYERSON TOOTH CORPORATION CAMBRIDGE 39 MASS

*i.e. carbon tetrachloride, acetone and monomers

Above teeth, processed together, have been equally exposed to dipping in bonded bourbon whiskey

*First . . .*

VITALLIUM®

NON-PRECIOUS CAST PARTIALS IN DENTISTRY

*Vitallium® partials*

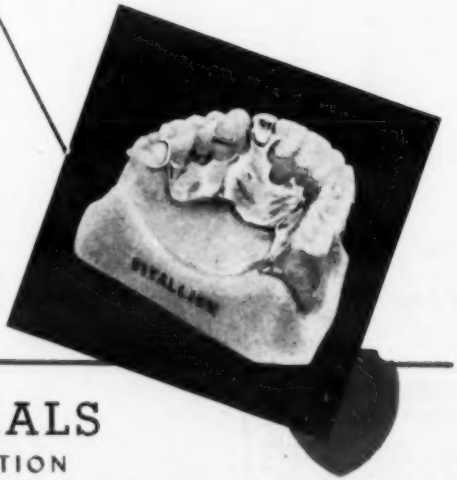
ARE THE BEST FOR
YOUR PRACTICE

THERE ARE GOOD REASONS WHY

- A BETTER ALLOY
- BETTER TECHNIQUE
- A BETTER PRACTICE BUILDER

☆ ☆ ☆

P R E S C R I B E



VITALLIUM PARTIALS

FOR GREATER PATIENT SATISFACTION

Austenal Laboratories, Inc.

New York

® by Austenal Laboratories, Inc.

Chicago

in Abbott's

Procaine Dental Cartridges

**For instance . . .**

- Practical experience since 1917 in the manufacture of procaine hydrochloride. Abbott was the first American firm to make procaine.
- Standards of purity which exceed U.S.P. requirements.
- Continually improved production processes, assuring you of solutions which are sterile, isotonic and adjusted to a pH that provides maximum stability.
- Abbott Procaine Dental Cartridges fit all standard dental syringes and are labeled for instant identification. Why not try this convenient, effective, time-saving method of administering procaine? You can obtain Abbott Cartridges through your usual source of supply in four commonly-used concentrations.

*Abbott's*

**PROCAINE HYDROCHLORIDE**

2% with Epinephrine 1:60,000, 1:50,000 and 1:30,000

4% with Epinephrine 1:50,000

*This is number three of a series of three announcements of nutrition research.*

# Keeping up with Nutrition Research

## Studies now available on the use of fat in intravenous feeding

RECENTLY, a group of scientists made extensive studies with animals to explore this important phase of intravenous nutrition. Their work, published a short time ago, discloses that finely emulsified solutions of oils—butter oil among them—were tested on experimental animals.*

Actual clinical trials are just beginning, but there is recorded evidence that fat emulsions may be given safely to human subjects.**

Should this dramatic new application of fats be perfected it would prove an invaluable aid in counteracting a calorie deficiency in the patient who is unable to take food by mouth. Certainly, it would fulfill an urgent need for a method of supplementing caloric intake in many pre- and post-operative cases.

*Stare, F. J., Mann, G. V., Geyer, R. P. and Watkin, D. M. *The Need of Fat in Intravenous Feeding.* J. Am. Oil Chem. Soc. *26*:145 (April) 1949.

**Mann, G. V., Geyer, R. P., Watkin, D. M. and Stare, F. J. *Parenteral nutrition IX Fat emulsions for intravenous nutrition in man.* J. Lab. Clin. Med. *34*:699 (May) 1949.

National DAIRY COUNCIL

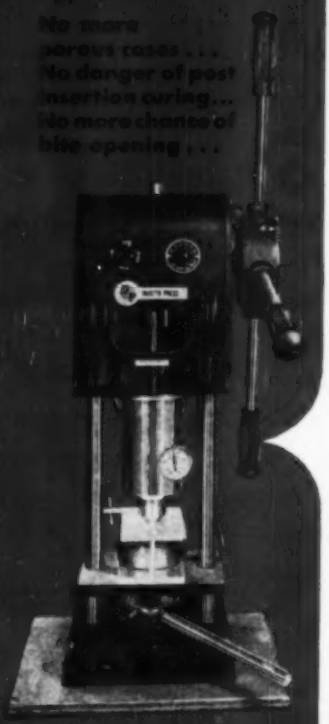
111 North Canal Street, Chicago 6, Illinois

*Since 1915 . . . the National Dairy Council, a non-profit organization, has been devoted to nutrition research and education to extend the use of dairy products.*

# New D-P Injecto Press

creates
FORM STABLE
dentures with
incredibly
lifelike
appearance

No more
porous cases . . .
No danger of post
insertion curing . . .
No more chance of
bite opening . . .



Here's the FIRST
successful adaptation
to Dental use of the
injection processing
of thermoplastic
resins! No wonder it's
making Dental history!

## No Porosity, Warpage or Open Bites

Dentists who make a great effort to obtain fine impressions and who have seen the results of this process are especially enthusiastic over its accuracy. D-P Denture Resin, being fully pre-cured before processing, results in non-porous cases and entirely eliminates the danger of post-insertion curing. Injection of the softened resin under low pressure into a completely closed and locked flask precludes the possibility of bite opening.

## D-P Denture Resin Especially Compounded for Injecto Press

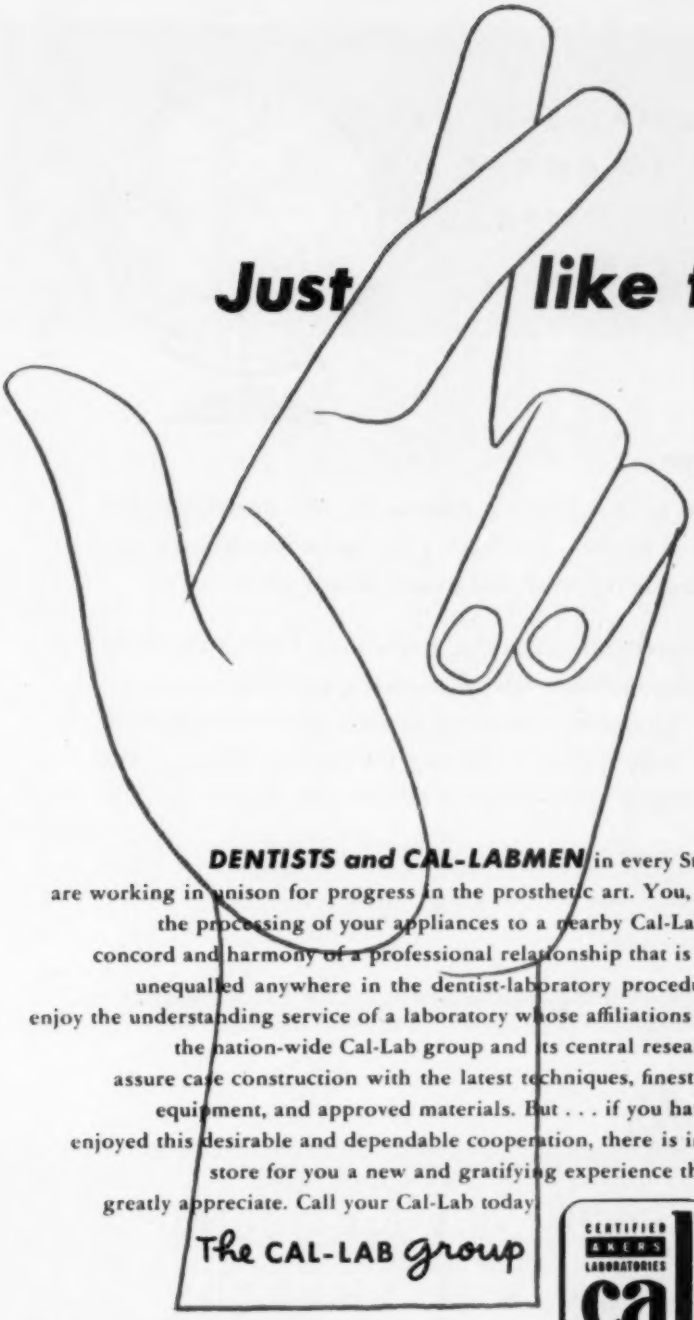
Softened only by heat, this resin is injected into a completely closed and locked flask with considerably less pressure than used in conventional powder-liquid processing. The soft consistency of the injected resin allows complete adaptation to the most minute detail.

## Judge For Yourself!

Your laboratory is now equipped to render you this service, or soon will be. Specify that your next case be processed in this manner. Compare the results with *any* previously experienced!

**dental perfection co.**

543 West Arden Ave., Glendale 3, Calif.



# Just like that!

**DENTISTS and CAL-LABMEN** in every State in the Union are working in unison for progress in the prosthetic art. You, who entrust the processing of your appliances to a nearby Cal-Lab, attest to the concord and harmony of a professional relationship that is unequalled anywhere in the dentist-laboratory procedure. You enjoy the understanding service of a laboratory whose affiliations with the nation-wide Cal-Lab group and its central research organization assure case construction with the latest techniques, finest precision equipment, and approved materials. But . . . if you have not, as yet, enjoyed this desirable and dependable cooperation, there is in store for you a new and gratifying experience that you will greatly appreciate. Call your Cal-Lab today.

The CAL-LAB group

CERTIFIED AMERS LABORATORIES cal SERVICE

REG. U. S. PAT. OFF.

*Do you read CAL magazine?*

*Ask your CAL-LAB to send it to you!*

IF YOUR PATIENT
GOES TO KOREA
...OR CAPETOWN,
OR CAIRO

Wherever Dentists practice, Steele's interchangeable facings are available — and Steele's FLATBACK New Hue facings are regarded as the world's standard bridge tooth.

Designed specifically as bridge teeth, these facings avoid the marked collar-line and wide interdental spaces of denture-tooth tradition. The character markings become light reflecting facets when wet with saliva, completing the perfect harmony with adjacent natural teeth — even to that lifelike sparkle.

Supreme esthetically . . . completely interchangeable . . . highly serviceable . . . and available the world over.

THE COLUMBUS DENTAL MANUFACTURING CO. • COLUMBUS 6, OHIO

Steele's FLATBACK facings
IN NEW HUE SHADES

# CO-RE-GA

## A brand name insures the makers responsibility

CO-RE-GA is the denture adhesive known wherever dental sundries are distributed and dentistry is practiced.

CO-RE-GA IS NOT ADVERTISED TO THE PUBLIC

Accepted
COUNCIL on DENTAL THERAPEUTICS
AMERICAN DENTAL ASSOCIATION

*Mail this coupon for your supply of professional samples*

Dr. _____

Address _____

City _____ Zone _____ State _____

**CO-RE-GA CHEMICAL COMPANY**

75 Mill Road • Jersey City 2, New Jersey

# You'd think they'd be more expensive

You gain in economy and efficiency when you use

## ODONTIA SPONGES

They're more absorbent than any other type of gauze, because of filmated cotton which is evenly distributed throughout the entire inner surface by a special J & J process.

Machine made to assure uniformity. No rough margins or loose threads. When you use them as bite or socket sponges, swabs and dams.

## You actually require fewer sponges

Available at your dealer in two sizes, 2" x 2" and 3" x 3" in sterile units and bulk packages not sterilized.

***Recognized by patients—Relied on by dentists***

DENTAL DIVISION

# A NEW SERVICE

• • • • •

## A Quarterly Cumulative
## INDEX TO DENTAL LITERATURE
### in the English Language

Each issue after the first contains all the material of the preceding issues. A handy reference for everyone who has occasion to refer to dental literature.

Sold on a subscription basis for $30 a year. Send in your order today to

**AMERICAN DENTAL ASSOCIATION**
**222 EAST SUPERIOR STREET, CHICAGO 11, ILLINOIS**

# INSURANCE

**ACCIDENT • HOSPITAL • SICKNESS**
**For Dentists, Physicians, Surgeons Exclusively**

ALL PREMIUMS COME FROM PHYSICIANS SURGEONS DENTISTS ALL CLAIMS GO TO

Cost has never exceeded amounts shown

| | |
|---|---|
| **$5,000.00 ACCIDENTAL DEATH**<br>$25.00 weekly indemnity, accident and sickness | **$8.00**<br>Quarterly |
| **$10,000.00 ACCIDENTAL DEATH**<br>$50.00 weekly indemnity, accident and sickness | **$16.00**<br>Quarterly |
| **$15,000.00 ACCIDENTAL DEATH**<br>$75.00 weekly indemnity, accident and sickness | **$24.00**<br>Quarterly |
| **$20,000.00 ACCIDENTAL DEATH**<br>$100.00 weekly indemnity, accident and sickness | **$32.00**<br>Quarterly |

Also hospital expense for members, wives and children at small additional cost

85c out of each $1.00 gross income used for members' benefit

**$3,500,000.00**
**INVESTED ASSETS**

**$16,000,000.00**
**PAID FOR CLAIMS**

$200,000.00 deposited with State of Nebraska for protection of our members

***Disability need not be incurred in line of duty—benefits from the beginning day of disability***

**PHYSICIANS CASUALTY ASSOCIATION**
**PHYSICIANS HEALTH ASSOCIATION**

48 years under the same management

**400 FIRST NATIONAL BANK BUILDING** **OMAHA 2, NEBRASKA**

THE
MEDICAL
PROTECTIVE
COMPANY
FORT WAYNE,
INDIANA

*Professional Protection Exclusively since 1899*

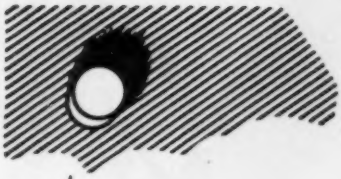
## *The NEW Crescent* WIG-L-BUG (Patented)

Here is the NEW, streamlined Model of the famous Wig-l-bug, the wonder electric-mortar-and-pestle that is placing amalgam work on a scientific basis. The dependable, trouble-free Wig-l-bug mechanism—that has proved so successful—is now housed in beautiful bakelite. And a New, accurate, easy-to-read electric timer has been added.

Requires only 7 to 10 seconds to triturate enough amalgam for the average filling. Saves time, prevents waste, produces uniformly perfect mixes with a smooth, fine texture. Use the Wig-l-bug with your preferred alloy.

*Thru Your Dealer or Direct*

*50th ANNIVERSARY YEAR*
*Crescent* DENTAL MANUFACTURING CO.
1839 South Pulaski Road, Chicago 23, Illinois



**fast convenient chemical disinfection** with

# PARKER'S GERMICIDAL TABLETS

Accepted Council on Dental Therapeutics American Dental Association

Simply drop two inexpensive Parker Tablets in a pint of water. In minutes you have a 1:1,000 solution of *stable, active germicide*—absolutely non-corrosive to instruments; non-irritating to hands, tissues.

Parker Germicidal Tablets give you effective chemical disinfection with no fuss, no bother. No time is lost in waiting for water to boil or instruments to cool. And no special equipment is needed. Order Parker Tablets from your dealer today. You'll be impressed with their convenience—amazed at the saving in time and money.

***80 TABLETS*** *Equiv. to 5 gals. of 1:1,000 solution* **only $5.50**

*SAMPLES ON REQUEST*

**A.J. PARKER COMPANY**
**PHARMACEUTICAL CHEMISTS**
PHILADELPHIA 4, PA.

## *for Dentists*

Dentists are now placing their orders for next year's Daily Log so that it will be on hand for their 1951 appointments . . . often made far in advance these busy days.

### Complete Tax Records

The DAILY LOG is a complete one-volume record book **for dentists.** It furnishes valid records for income tax reporting . . . also reduces billing mixups, catches all charges due, itemizes all expenses. Dentists praise its simplicity and completeness—a favorite for over 16 years.

Available through your Dental Supply Dealer, or send this coupon for quick action.

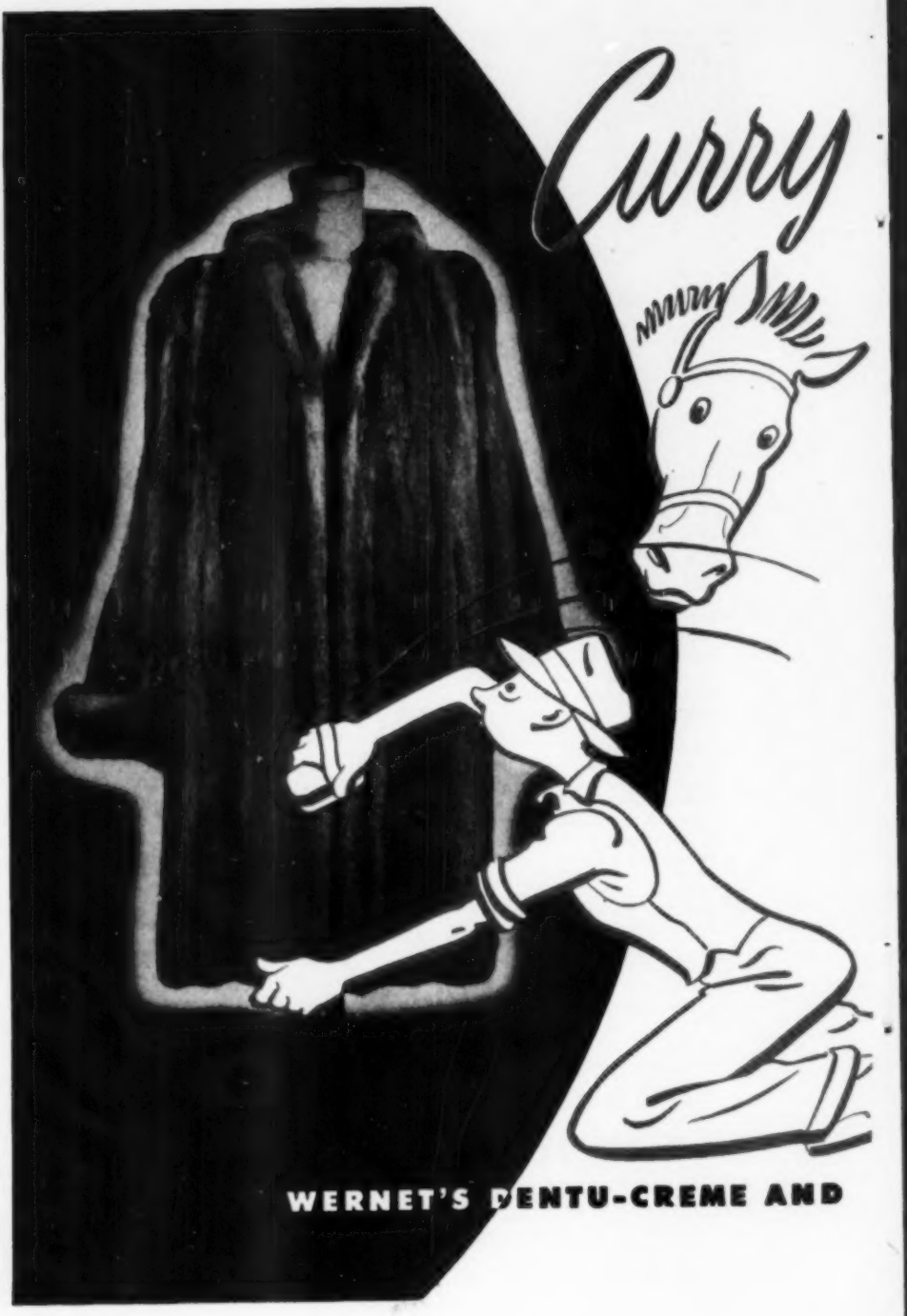
***Use this handy coupon . . .***

COLWELL PUBLISHING CO.
262 University Avenue, Champaign, Illinois

☐ Send me your Daily Log for 1951. Check for $6.50 is enclosed. If I am not completely satisfied, the unused book can be returned for full refund.

☐ I would like to try the Daily Log for the remainder of 1950 at a reduced price. Please send complete information.

☐ Send me your catalog showing the complete line of Colwell Office Record Supplies for Dentists.


Curry
WERNET'S DENTU-CREME AND

# *Comb* A MINK COAT?

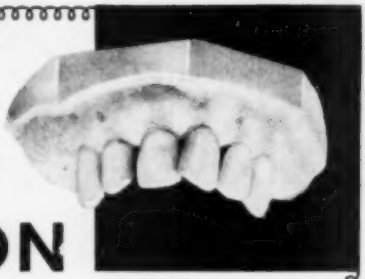
Hardly! The precious pelts must be cleaned with the greatest of care, lest their delicate beauty and integrity be irreparably marred. Dentures, too—costly and frangible products of prosthodontic art—may be forever ruined by carelessly chosen cleansers. Give your patients added denture protection by telling them about Wernet's Dentu-Creme and Wernet's Plate Brush. Dentu-Creme is smooth, absolutely non-injurious, and an excellent detergent. The special polishing agent it contains makes it ideal for use on acrylics. Wernet's Plate Brush with the Easy Grip Handle, conforms to professional specifications. Its divided tufts of fine bristles are individually wired-in for long life. Its black bristle section is used on the ridge and the vault—its white bristle section on the teeth and interproximal surfaces. For safe, yet thorough removal of mucin plaques, food particles and stubborn stains, suggest Wernet's Plate Brush and Wernet's Dentu-Creme!

**WERNET DENTAL MANUFACTURING COMPANY, INC.**
Jersey City 2, N. J.

3-T

**WERNET'S PLATE BRUSH**

*for the fastidious . . . a*



# DUPLICATION

## OF PATIENT'S DENTITION

## *in the Customed Denture*

**for immediate insertion**

The patient's remaining dentition serves as the mold for the Customed denture. Where indicated, hand-carved wax teeth are set up for the try-in on a base plate in order to establish functional occlusion, balance, centric and vertical relation.

Anatomical characteristics of the patient's natural dentition are duplicated with fidelity. Form, spacing, abrasion, and shading of natural teeth are faithfully reproduced. The Customed denture is inserted immediately after surgery.

Address us regarding literature on preparatory work.

20 Years 1930-1950 MOSKEY & GEISS

*Customed by*

Moskey DENTURE

MOSKEY & GEISS

HURON-NINTH BUILDING

CLEVELAND, OHIO

# Here it is!

## The Compound Knife
## you've been waiting for

Now it is possible to accurately trim compound impressions with this new Bard-Parker knife, especially designed for the purpose. The two-unit knife combines a palm-fitting plastic handle and a sturdy detachable blade which can be instantly replaced with a new, sharp blade when needed.

Ask your dealer for the new B-P Blade No. 25 . . . fits the popular B-P Plastic Handle No. 6.

**PRICE**

B-P Blade No. 25, per pkg. of 6 ..... 75c
B-P Plastic Handle No. 6 ..... $2.00

**BARD-PARKER COMPANY, INC.**
Danbury, Connecticut

B-P

A BARD-PARKER PRODUCT

# announcing . . . .

## THE SECOND EDITION OF THE AMERICAN DENTAL DIRECTORY

*. . . Publication Date — November, 1950*

- Lists more than 80,000 dentists alphabetically and geographically including street address, city and state.
- Shows general practitioners and specialists.
- Indicates dental school attended and date of graduation.

Included in this great directory is every dentist whose name can be verified. Invaluable for referring patients, looking up friends and classmates.

Should be on the desk of every dentist and everyone who does business with dentists.

**FILL IN AND MAIL TODAY . . . save $2.50**

**AMERICAN DENTAL ASSOCIATION**
222 East Superior Street, Chicago 11, Illinois

I wish to take advantage of your money-saving offer by ordering my Directory today. I enclose payment of Ten ($10) Dollars.

Signed _____
Please Print or Type

Street _____

City _____ Zone ____ State ____

Price will be $12.50 after publication

JULY 1950

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

VOLUME 41 • NUMBER 1

# The effect of radioactive phosphorus upon the development of the teeth and mandibular joint of the mouse

*M. S. Burstone, D.D.S., M.A., St. Louis*

The discovery of nuclear fission and the subsequent production of radioactive isotopes have been hailed by biologists as the key to the understanding of many of the complex metabolic processes of living organisms.

Radioactive phosphorus ($P^{32}$), which has been available for about ten years, is a beta emitter with a half life of 14.3 days. Because of the important role of phosphorus in the processes of osteogenesis and odontogenesis, it is apparent that radioactive phosphorus metabolized in the teeth and bone would continuously irradiate these structures.

Although the biological effects of ionizing radiation produced by radioactive isotopes have been intensively studied in the past few years,[1] a review of the literature reveals that histopathological studies of the teeth and supporting structures have not been undertaken.

The project herein reported was undertaken in order to study on a histopathological basis the alterations of structure and function of the odontogenic apparatus and investing tissues in response to the internal administration of a beta emitter, radioactive phosphorus. Since beta rays are high speed electrons, this work is a study on the effect of electron bombardment of the developing oral tissues.

The mouse, which was selected as an experimental animal, has a monophyodont dentition with a dental formula consisting of incisor 1/1, cuspid 0/0, pre-

Prize winning essay read before the Midwinter Meeting of the Chicago Dental Society, February 8, 1950.

Department of Oral Pathology, Washington University School of Dentistry, and Department of Pathology, Washington University School of Medicine.

The $P^{32}$ used in this investigation was supplied by the Oak Ridge National Laboratory on allocation from the Isotopes Division, U. S. Atomic Energy Commission.

1. Bloom, William: Histopathology of Irradiation, ed. 1, New York: McGraw-Hill Book Company, Inc., 1948.

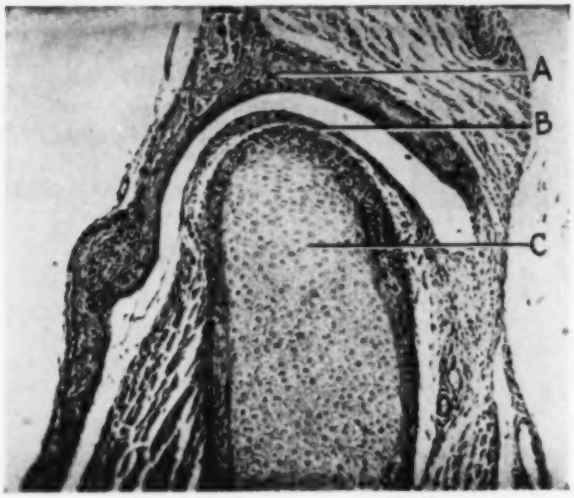



*Fig. 1 • Mandibular joint of normal one day old mouse. A, cranial portion of joint; B, interarticular disk; C, condylar cartilage. (x75)*

molar 0/0, and molar 3/3. The incisors of both jaws are bow-shaped, and in the mandible project back below the roots of the third molars. Rodent incisors grow continuously from persistent pulps, and the calcification and eruption of these teeth continue throughout the life of the animal. The structure of the molar teeth, the development of which is limited to the first month of life, bears a similarity to the molar teeth of the human dentition. The developing tooth of the mouse is a valuable biological indicator of the metabolic status of the animal, for the developing enamel and dentin record a histological pattern of the factors which alter the calcification of tooth structure. This histological pattern, unlike the transitory histological changes in bone, cannot be altered. Since calcium is not withdrawn from tooth structure, the teeth furnish a permanent record of changes in mineral metabolism over a period of time.

The growth and development of the condyle of the mouse has been described by Levy.[2] The condylar process of a one day old mouse is composed of cartilage with a thin, flattened layer of undifferentiated cartilage cells adjacent to the articular surface (Fig. 1). As the animal grows older the hypertrophic cartilage cells adjacent to the marrow show evidence of capillary invasion (Fig. 5, left). At the same time, osteoblasts which are derived from connective tissue cells surround the remnants of the cartilage matrix and deposit bone matrix which calcifies and becomes trabecular bone. The periosteum forms intramembranous bone. Chondrogenesis and osteogenesis are slowed after the first month but the growth potential of the condyle is not lost.

## METHODS

In this experiment 50 C57 black mice, 2 to 10 days of age, were injected subcutaneously with a sterile solution of carrier free $P^{32}$ in amounts varying from 5 to 60 microcuries per gram of body weight. $P^{32}$ was combined as $H_3PO_4$, with

2. Levy, B. M., Growth of mandibular joint in normal mice, J.A.D.A. 36:177 (Feb.) 1948.

a normality of approximately 0.06. The control animals consisted of untreated mice and also mice which were injected with nonradioactive phosphoric acid in amounts equal to the radioactive dosages. Approximate dosages given were 5, 10, 15, 20, 25, and 60 microcuries per gram of body weight.

Following injection the animals were sacrificed at specified time intervals along with the controls. The heads were split longitudinally, fixed in 10 per cent formalin, decalcified in formic acid, embedded in paraffin, and sectioned serially. The condyles were sectioned in a frontal plane and the jaws and teeth were sectioned in a sagittal plane. All sections were stained with hematoxylin and eosin.

All photomicrographs were taken with a Leitz photomicrographic camera at a magnification of 75x.

## RESULTS

*Gross Observations* • Radioactive phosphorus in dosages of 10 microcuries or more per gram of body weight produced a marked retardation of body development. The animals did not gain weight, appeared cachectic, and lacked motor coordination. In some animals depigmentation of fur and epilation occurred. None of the animals survived longer than twenty days.

*Microscopic Observations* • Microscopic study of the animals given nonradioactive phosphorus revealed no histological abnormalities.

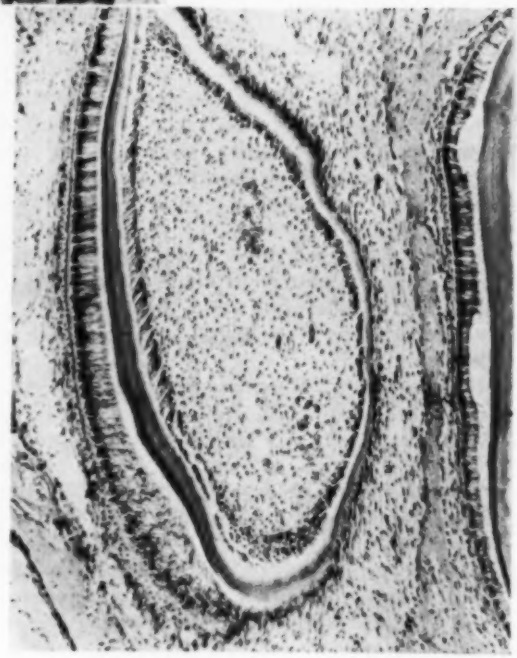
60 Microcuries • Histological examination of the jaws of animals given 60 microcuries per gram of body weight revealed disturbances of dentinogenesis and osteogenesis. Three days following administration of 60 microcuries per gram of body weight to 3 day old mice, the first and second molar teeth (histodifferentiation of the third molar had not taken place as yet) exhibited a slight irregularity at the apical portion of the root. Associated with this irregularity were odontoblasts which had assumed a polyhedral shape and had cytoplasmic processes. These altered odontoblasts were partly enclosed by an osteodentin matrix. The junction between the dentin and predentin in this area was irregular. The odontoblasts toward the coronal portion of the tooth appeared normal and the entire ameloblastic layer was likewise unchanged. Osteodentin formation was most prominent at the apexes of the incisor teeth (Fig. 2).

The alveolar basal bone exhibited a marrow aplasia with a marked decrease in the number of osteoblasts, and the nuclei of some of the osteocytes were pyknotic. A few osteoclasts were present in the marrow spaces adjacent to Howship's lacunae, and the fibroblast constituted the predominant cell type.

The marrow of the condylar and cranial portion of the joint was aplastic. The cartilage cap of the condyle was thin and there was a distortion of trabecular bone formation at the zone of erosion. Some of the hypertrophic cells were swollen and their nuclei were shrunken and stained darkly. These changes were present to a lesser degree in the intermediate zone. The undifferentiated or resting zone appeared normal as did the interarticular disk (Fig. 3).

Seven days following the administration of 60 microcuries of $P^{32}$ per gram of body weight (4 day old mice) there was an increase of osteodentin formation in both the molar and incisor teeth (Fig. 4). In many areas the altered odontoblasts were trapped by this osteodentin matrix. The remaining odontoblasts and the pulp connective tissue exhibited hydropic degeneration. The odontoblasts toward the root end of the molar teeth showed a tendency to flatten out and were more or less ovoid in appearance. Cloudy swelling and hydropic degeneration of the ameloblasts were also prominent and some of the remaining ameloblasts toward the apical portion of the tooth appeared

*Fig. 2 • Left: Cross-section of apical end of incisor tooth of 6 day old mouse, 3 days following administration of 60 microcuries per gram of body weight of $P^{32}$. A, pulp showing altered odontoblasts and osteodentin. (x75)*



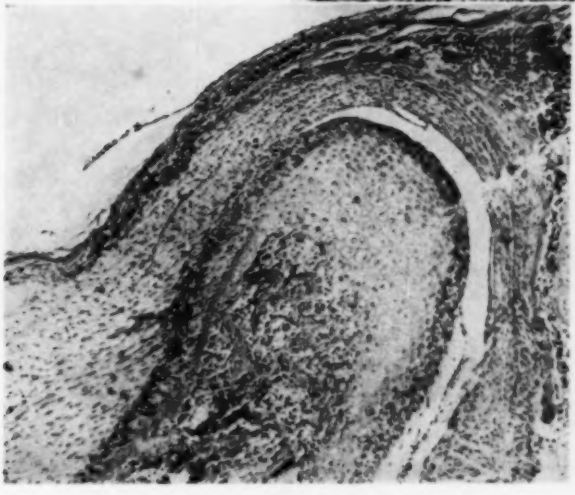
*Right: Cross-section of apex of incisor tooth of normal 6 day old mouse. (x75)*

as low cuboidal cells. Adjacent to the areas of osteodentin at the apexes of the molar teeth were masses of a faintly reticulated globular structure which took both acidophilic and basophilic stain in an irregular manner. The outlines of trapped cells could be seen within this material (Fig. 4. See also Fig. 9, right). There was no histological evidence of formation of the third molar.

The alveolar bone exhibited a severe marrow aplasia (Fig. 4, left). A few osteoblasts per low-power field were present and there was a lack of trabecular development as compared with the normal controls. Numerous osteoclasts were present in the marrow spaces. There was a marked aplasia of the connective tissue forming the periodontal membrane.

The cartilage cap of the condyle was

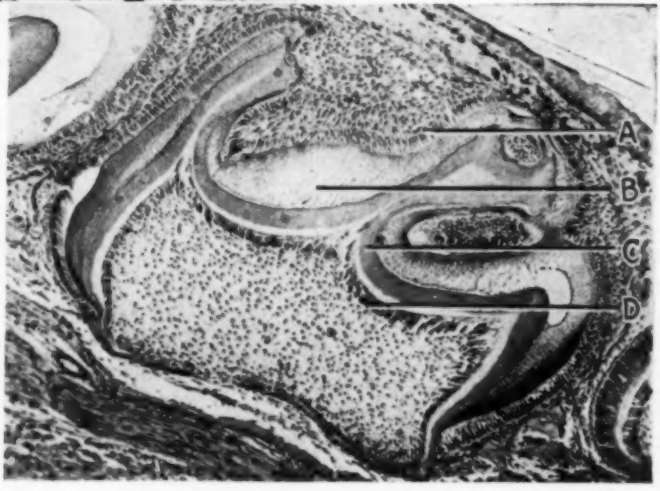
*Fig. 3 • Right: Mandibular joint of 6 day old mouse, 3 days following administration of 60 microcuries per gram of body weight of $P^{32}$. The cartilage cap is thin, there is a distortion of the cartilage cells at the zone of erosion, and the marrow cellularity is decreased. (x75)*



*Left: Mandibular joint of normal 6 day old mouse. Note the thick cartilage cap. (x75)*

thin and there was an aplasia of the marrow which was greater than was observed in the previous stage. The marrow space contained numerous extravasated red blood cells, some fibroblasts, and a few osteoclasts. Trabecular and cortical bone formation was poor and irregular, and this immature bone was fibrillar and

*Fig. 4 • Left: Second molar tooth of 11 day old mouse, 7 days following administration of 60 microcuries per gram of body weight of $P^{32}$. Note the marked aplasia of the marrow. A, degenerating ameloblasts; B, enamel matrix; C, dentin; D, degenerating odontoblasts; E, osteodentin and globular calcified material at apex; F, inferior alveolar nerve. (x75)*




*Right: Second molar tooth of normal 11 day old mouse. A, ameloblasts; B, enamel matrix; C, dentin; D, odontoblasts. (x75)*

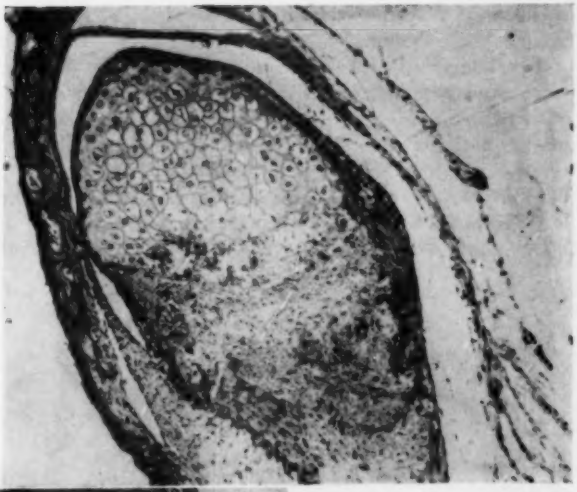
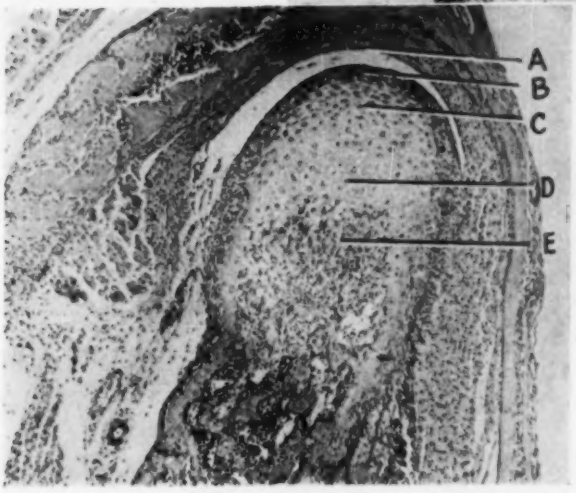


*Fig. 5 • Right: Mandibular joint of 10 day old mouse, 7 days following administration of 60 microcuries per gram of body weight. The marrow space contains extravasated erythrocytes. Bone formation is of the immature fibrous type. Note the pyknotic nuclei of the cartilage cells as compared to the normal control (See Fig. 5, below). (x75)*




*Left: Mandibular joint of normal 10 day old mouse. A, interarticular disk; B, embryonic zone; C, intermediate zone; D, hypertrophic zone; E, zone of erosion. (x75)*

exhibited a basophilia. The resting zone and the interarticular disk appeared normal. The cranial portion of the joint exhibited a marrow aplasia and fibrosis (Fig. 5).

25 Microcuries • With dosages of 25 microcuries of $P^{32}$ per gram of body weight (6 day old mice) the following changes were present seven days following injection. The apical portions of the first and second molar teeth exhibited osteodentin formation similar to that described in previous series. The ameloblasts appeared as cuboidal cells toward the root portion of the crown and there was cloudy swelling and hydropic degeneration of the pulp connective tissue. Aplasia of the marrow was marked and numerous osteoclasts were present. There

was a reduction in the number of osteoblasts.

The changes in the mandibular joint were similar to those described for the 60 microcurie series. However, osteoblastic activity was more evident and there was greater trabecular bone formation than in the 60 microcurie series, but the bone was still of the immature fibrillar type.

Ten days following injection there was a greater amount of osteodentin formation in the first, second, and third molar teeth. The third molar tooth exhibited spicules of osteodentin scattered throughout the pulp. No normal odontoblasts were present, and the distorted odontoblasts were trapped within this dentinoid material. What would have been the future occlusal surface of the

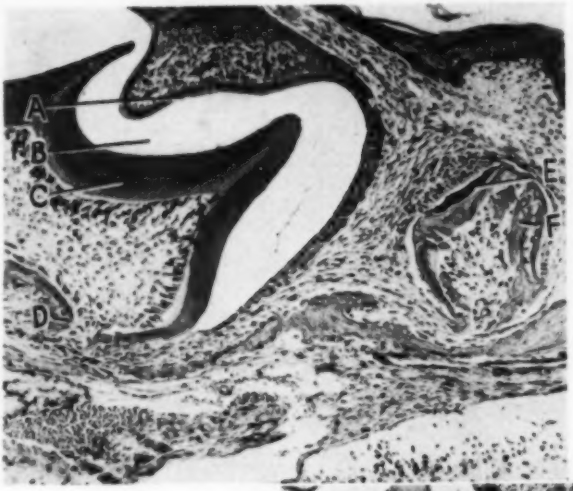



*Fig. 6 • Left: Second and third molar teeth of 16 day old mouse, 10 days following dosage of 25 microcuries per gram of body weight. No normal odontoblasts are present in the third molar. A, ameloblastic layer of second molar; B, enamel space; C, dentin; D, osteodentin and irregular root formation; E, enamel matrix of third molar; F, osteodentin in pulp chamber. (x75)*

*Right: Second and third molar teeth of normal 16 day old mouse. The roots of the second molar are well developed. (x75)*

third molar was covered by a thin band of enamel matrix above which were ameloblasts appearing as cuboidal cells. The cells of the ameloblastic layer along the sides of the tooth had taken on a squamous appearance. These low cuboidal type cells were also present along the sides of the first and second molar teeth and again the ameloblasts along the future occlusal surface were columnar (Fig. 6). The periodontal membrane and alveolar bone were poorly formed and the marrow was slightly fibrotic (Fig. 6, left).

The cartilage cap of the condyle ten days following injection was much thinner than at the seven-day stage (Fig. 7). An average of three or four hypertrophic cells was visible in a low-power field and most of these cells exhibited the degen-

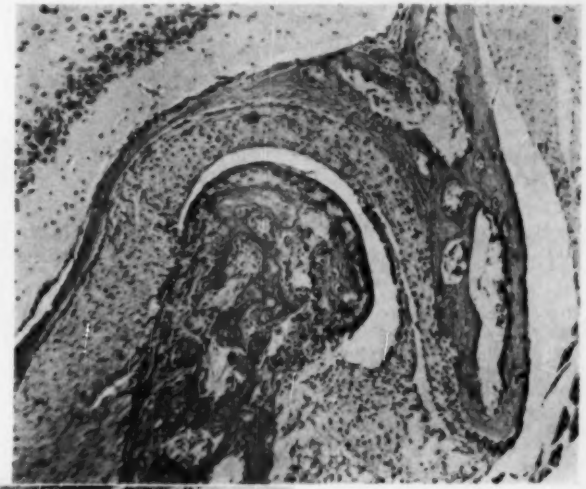
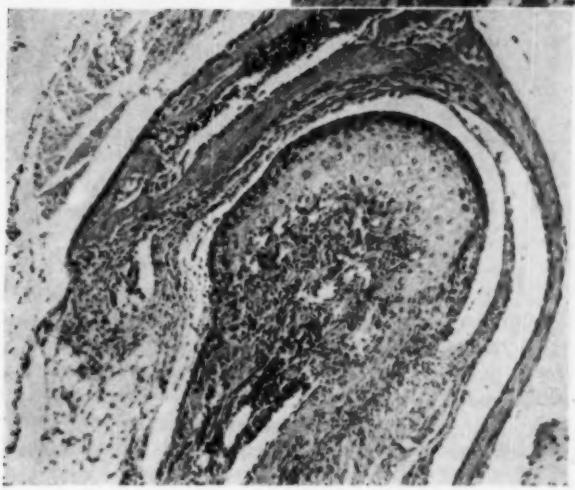
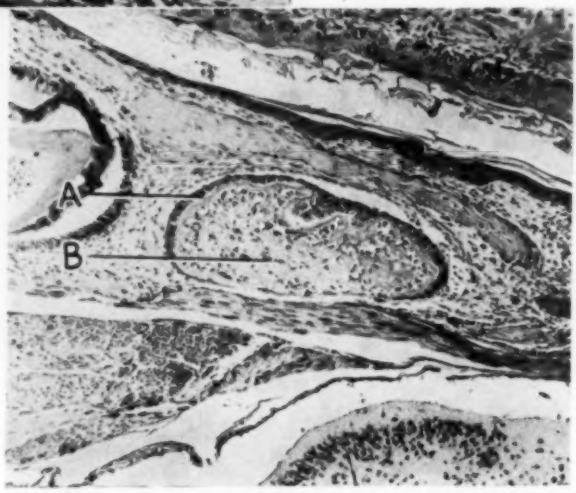


*Fig. 7 • Right: Mandibular joint of 16 day old mouse, 10 days following dosage of 25 microcuries of $P^{32}$ per gram of body weight. The cartilage cap is very thin and subcartilage linkage is prominent. The trabeculae are of an immature fibrous bone. (x75)*



*Left: Mandibular joint of normal 16 day old mouse. (x75)*

*Fig. 8 • (See Fig. 4, right, for comparable control). Left: Second molar of 9 day old mouse 7 days following dosage of 18 microcuries of $P^{32}$ per gram of body weight. A normal odontoblastic layer is not present. A, osteodentin in pulp chamber; B, nerve; C, osteoclast. (x75)*

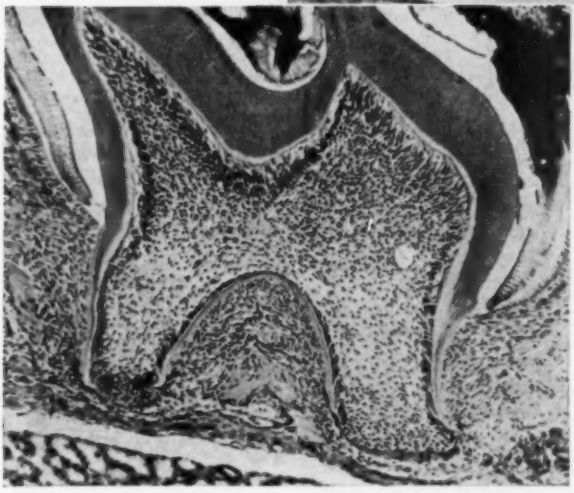



*Right: Second molar of 9 day old mouse 7 days following dosage of 18 microcuries of $P^{32}$ per gram of body weight. The normal structure of the crown has been markedly altered. A, ameloblastic layer; B, osteodentin in pulp chamber. (x75)*

erative changes previously described. There was extensive new bone formation of the immature type and subcartilage linkage was prominent. The marrow spaces were relatively acellular except for numerous osteoblasts adjacent to the bone. No osteoclasts were visible.

15 to 20 Microcuries • Seven days following the administration of 15 to 20 microcuries of $P^{32}$ per gram of body weight to 2 day old animals, there was a scattering of osteodentin through the pulp of the second molar tooth. The ameloblasts on the future occlusal surface were columnar in appearance whereas those along the sides of the tooth appeared as low cuboidal cells (Fig. 8, above). Some second molars did not have a normal morphologic outline and ap-

*Fig. 9 • Right: Second molar tooth of 13 day old mouse 8 days following dosage of 15 microcuries of $P^{32}$ per gram of body weight. Note the absence of root development and the formation of a globular calcified material at the apex, A. (x75)*



*Left: Second molar of normal 14 day old mouse. The root structure is well developed and tapers toward the apex. (x75)*

peared bell-shaped with a layer of cuboidal shaped ameloblasts on one surface (Fig. 8 right). Several 5 day old mice given $P^{32}$ exhibited formation of an atypical globular calcified material at the apex of the second molar (Fig. 9). The third molar tooth had failed to develop and only its anlage was present.

The marrow aplasia of the alveolar bone was marked and osteoblastic activity was reduced. Numerous osteoblasts were present (Fig. 8, left).

Changes in the mandibular joint were similar to those which have been described. However, the cartilage cap was thicker than in animals which had received heavier irradiation, and the bony subcartilage linkage was not so prominent. Osteoblastic activity was decreased and osteoclasts were found to be present

*Fig. 10 • (See Fig. 5, left, for comparable control). Mandibular joint of 9 day old mouse 7 days following dosage of 18 microcuries of $P^{32}$ per gram of body weight. Observe the marrow aplasia and the presence of osteoclasts, A. (x75)*

in the marrow spaces (Fig. 10).

Eleven days following the administration of 15 microcuries of $P^{32}$ per gram of body weight to 11 day old mice, the histological picture was similar to that described in the previous two paragraphs. However, osteodentin formation at the apex of the incisors (Figs. 7, right and 11, left) was prominent, and there was a cessation or retardation of molar root formation. The second molar tooth was still unerupted as compared with that of a normal 22 day old control animal which had erupted. There was a striking aplasia of the periodontal membrane, the alveolar bone, and the marrow (Fig. 12).

The cartilage cells of the condyle were larger than normal, and exhibited the changes previously described. Cartilage linkage was present at the zone of erosion. The marrow aplasia of both the condylar and cranial portions was prominent (Fig. 13).

10 Microcuries • With dosages of 10 microcuries of $P^{32}$ per gram of body weight (3 to 13 day old mice ten days following injection) the marrow aplasia was pronounced and there was a slight decrease in the number of osteoblasts. The tooth structure was normal except for a slight irregularity of dentin at the apical portion of the root.

The cartilage cap of the condyle was thin, the marrow was aplastic, and the new trabecular formation was slightly irregular. An occasional osteoclast was present at the zone of erosion (Fig. 14).

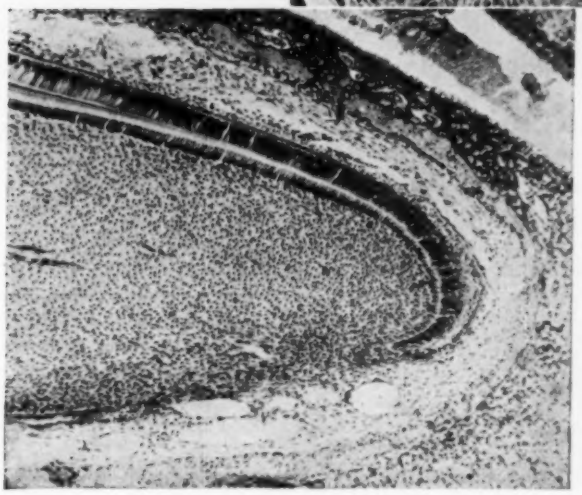
5 Microcuries • With dosages of 5 microcuries of $P^{32}$ per gram of body weight, the teeth, supporting structures and mandibular joint appeared normal. The only change visible was a slight marrow aplasia.

In addition to this entire series, two pregnant mice were given 15 microcuries of $P^{32}$ per gram of body weight. Two and three days later litters were born. At 5 days of age the animals appeared moribund and were sacrificed. Histologically, the first molar teeth exhibited abnormal odontoblasts, osteodentin formation, and ameloblasts which had assumed a cuboidal appearance (Fig. 15). Histodif-

ferentiation and morphodifferentiation of the second molar teeth had been seriously affected. The entire ameloblastic layer appeared as low cuboidal cells and a definite odontoblastic layer was lacking. Between the ameloblasts and the pulp connective tissue and adjacent to the former was a thin matrix of dentin-like material (Fig. 15). The growing end of the incisor tooth also exhibited a marked distortion. A marrow aplasia, presence of osteoclasts, and reduced osteoblastic activity was similar to that produced by the administration of 12 to 25 microcuries of $P^{32}$ per gram of body weight to older animals.

The condyle exhibited a marrow aplasia with a replacement of marrow cells by spindle cells and a few osteoclasts. There was little evidence of new bone

*Fig. 11 • Right: Sagittal section through apex of incisor tooth of 22 day old mouse 11 days following dosage of 15 microcuries of $P^{32}$ per gram of body weight. A, normal odontoblasts; B, osteodentin formation with trapped cells. (x75)*



*Left: Apex of incisor tooth of normal 22 day old mouse. (x75)*

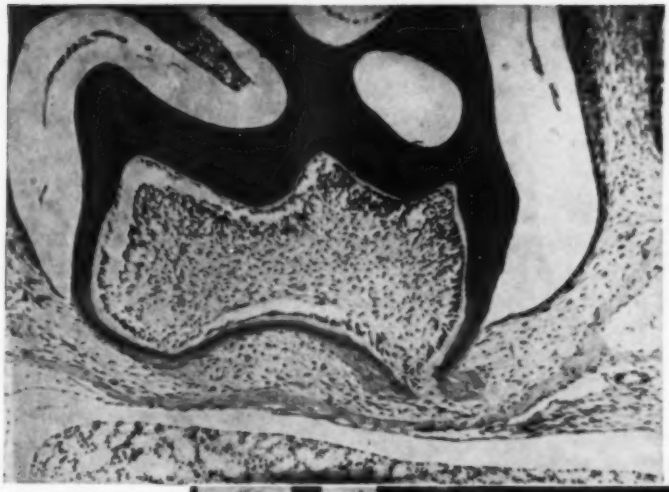


*Fig. 12 • Left: Second molar tooth of 22 day old mouse 11 days following dosage of 15 microcuries of $P^{32}$ per gram of body weight. Observe the abortive attempt at root formation and osteodentin at the apex. The periodontal membrane and underlying bone are poorly formed. (x75)*

*Right: Second molar tooth of normal 22 day old mouse. The roots and supporting structures are well developed. (x75)*

formation. The cartilage cap was only slightly thinned and the entire condyle presented the general appearance found in an animal at birth.

## DISCUSSION

The histological changes described may have been the result of secondary factors aside from the primary irradiation of the teeth and supporting structures. These secondary factors may involve endocrine dysfunction due to systemic irradiation. However, on the basis of comparative x-ray studies, the author feels that the changes resulting from internal administration of $P^{32}$ represented a primary radiation effect. (In the x-ray experiment, areas 5 to 7 mm. in diameter of the mouse jaw were irradiated by the use

of a contact type x-ray machine. Because the intensity of radiation falls off rapidly, the oral structures on the opposite side of the head received relatively little radiation. It is felt that this experiment illustrates the primary effect of x-ray irradiation upon the oral tissues.[3,4])

The most marked changes of odontogenic structure and function were produced by 15 to 25 microcuries per gram of body weight. With the administration of 60 microcuries of $P^{32}$ per gram of body weight the intensity of radiation produced a frank tissue necrosis.

3. Burstone, M. S., The effect of x-ray irradiation on the teeth and supporting structures of the mouse, J.D. Res. 29:220 (April) 1950.

4. Burstone, M. S., The effect of x-ray irradiation on the development of the mandibular joint of the mouse, J.D.Res. (in press).

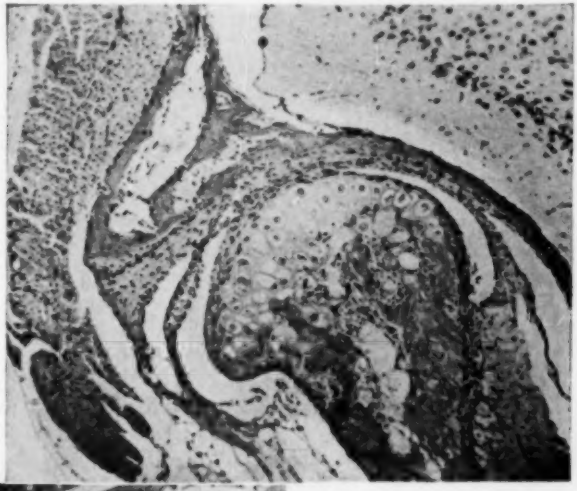
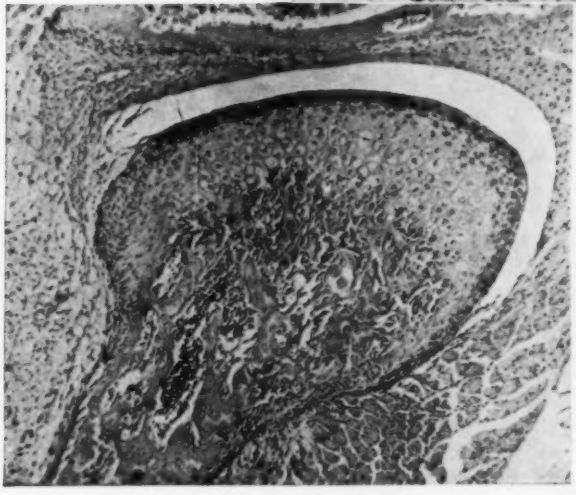


*Fig. 13 • Right: Mandibular joint of 22 day old mouse 11 days following dosage of 15 microcuries of $P^{32}$ per gram of body weight. Note the swollen cartilage cells and the marrow aplasia. (x75)*



*Left: Mandibular joint of normal 22 day old mouse. (x75)*

*Fig. 14 • Mandibular joint of 13 day old mouse 8 days following dosage of 10 microcuries of $P^{32}$ per gram of body weight. The hypertrophic cartilage cells are enlarged and exhibit pyknotic nuclei, and there is a marrow aplasia. (x75)*

With $P^{32}$ the degree of alteration of the processes of histodifferentiation and morphodifferentiation was dependent upon the stage of development of the individual tooth. Thus, the administration of $P^{32}$ to 2 and 3 day old mice resulted in the failure of the third molar tooth to form. Administration of $P^{32}$ to older animals in which histodifferentiation of ameloblasts of the third molar had occurred resulted in more destructive changes to the third molar tooth than to the first and second molar teeth. (Histodifferentiation of ameloblasts and odontoblasts of first and second molar teeth begins *in utero*.)

Following injection, unaltered ameloblasts were found adjacent to the area of the crown which was previously formed. There was less ameloblastic destruction and distortion in the area of the future cusps where the ameloblasts had first differentiated. Furthermore, enamel matrix was present only in these areas (Fig. 6, left). This suggests that beta radiation of sufficient intensity results in an alteration or disruption of histogenesis of ameloblasts from the inner enamel epithelium and furthermore, that the absence of destructive changes in the older ameloblasts indicated their relative radioresistance. Finally, the presence of squamous and low cuboidal cells indicated that the structure of the inner enamel epithelium had been altered. The radiosensitivity and radioresistance of the odontoblasts followed a pattern similar to that of the ameloblast. However, the odontoblast was far more radiosensitive than the ameloblast.

The apparent alteration of the columnar odontoblast to polyhedral shaped cells which resembled osteoblasts may be interpreted as a radiation induced cellular dedifferentiation. However, it was observed that the mature odontoblasts were not associated with osteodentin formation. This would indicate that the developing odontoblasts failed to reach a certain level of differentiation and formed osteodentin instead of dentin. The presence of osteodentin throughout the pulp of some teeth also indicates that there was a differentiation of the connective tissue cells of the pulp to osteoid forming cells. The globular reticular ma-

terial which formed in close association with the osteodentin at the root portion of the tooth may have been an atypical form of cementum, or else a combination of osteodentin and cementum.

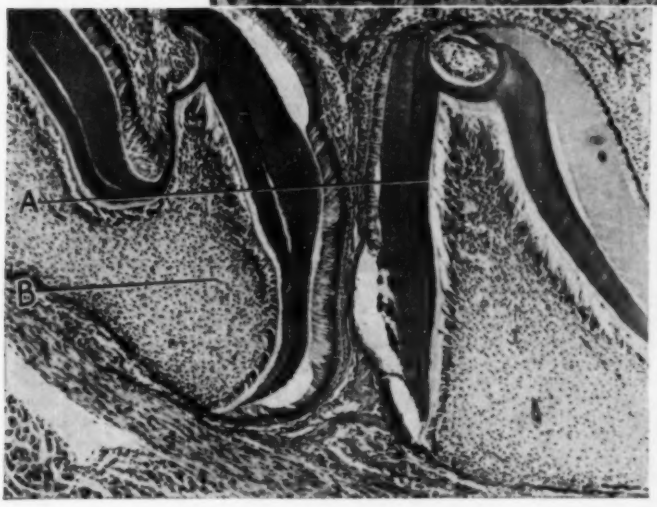
The effect of $P^{32}$ upon the condyle is similar to that produced by x-ray irradiation except that with x-ray the marrow aplasia and osteoclastic activity are less prominent.

## SUMMARY AND CONCLUSIONS

Administration of radioactive phosphorus, $P^{32}$, to young mice resulted in disturbances of osteogenesis or odontogenesis, or both.

With dosages of 15 to 60 microcuries per gram of body weight, the ameloblasts toward the root portion of the crown appeared as low cuboidal or squamous

*Fig. 15 • Right: A, first and B, second molar teeth of 5 day old offspring of pregnant mouse which received $P^{32}$. (x75)*




*Left: A, first and B, second molar teeth of normal 5 day old mouse. (x75)*

cells. There was a cessation of histodifferentiation of new ameloblasts.

With the same dosages the structure of the odontoblast was altered. The older odontoblasts toward the coronal portion of the tooth appeared unchanged, while the newly differentiated odontoblasts at the root portion of the tooth appeared as spindle cells with cytoplasmic processes. These cells were associated with osteodentin formation.

There was a cessation of morphodifferentiation of the root structure of the animals which survived longer than two weeks.

The odontoblast was more radiosensitive than the ameloblast.

The most marked changes in histodifferentiation and morphodifferentiation were observed in the offspring of pregnant mice which received $P^{32}$.

Dosages of 10 to 60 microcuries of $P^{32}$ per gram of body weight produced a marked marrow aplasia of the alveolar bone. With 15 to 60 microcuries per gram of body weight there was a marked decrease in osteoblastic activity with the formation of immature fibrillar bone.

Ten to 60 microcuries of $P^{32}$ per gram of body weight resulted in an inhibition of ossification and calcification of the mandibular condyle. Marrow aplasia, subcartilage linkage, and decreased osteoblastic activity with poor trabecular formation were present. The areas of the cartilage cap exhibited a decreasing radiosensitivity in the following order: zone of erosion, hypertrophic zone, intermediate zone, and embryonic zone. The interarticular disk was radioresistant.

The effect of beta irradiation upon the teeth and jaws is similar to that of x-radiation.

*4559 Scott Avenue*

*Advances in Treatment of Leukemia* • Aminopterin (4-aminopteroylglutamic acid), a powerful antagonist of folic acid, synthesized in 1947, has been reported to be somewhat effective in the control of certain clinical forms of leukemia. Farber has recently reported the results of his study of 60 children with acute leukemia who were given aminopterin or one of the other analogues of folic acid. Fifty per cent of these children showed hematologic improvement. Dameshek, in the same number of *Blood*, concluded from his study of 35 patients, adults as well as children, who had acute or subacute leukemia, that antagonists of folic acid possessed the capacity to induce remissions in about one third of his cases. The results were of sufficient magnitude to permit Dameshek to conduct that a well-defined therapeutic advance had been made and that continued investigation along these lines was indicated. *George M. Higgins and Kathryn A. Woods, "The Effect of the Folic Acid Antagonist, 4-Aminopteroylglutamic Acid, on the Growth of Transplanted Mammary Tumors in C3H Mice," Proc. Staff Meetings of the Mayo Clinic 24:238, April 27, 1949.*

# Dental roentgenography
# IV. The voltage factor (kv. p.)

*Gordon M. Fitzgerald, D.D.S., San Francisco*

The ideal dental roentgenogram is a permanent record of the variation in roentgenopacity caused by proportionate differences in absorption of the roentgen rays by the respective tissues. The structures are interpretively visible to the extent that they are differentiated from their surroundings because of differences in density, or contrast. Whenever possible, the density and differences in density should be controlled by changes in the degree of penetration; that is, by changes in the voltage factor (kv.p.).

Density is defined as the degree of darkness on the film, and contrast is known as the difference in the degree of density between film areas. While it is evident that density and contrast are separate roentgenographic characteristics, it is recognized that together they affect the visibility of structures and tissues in the roentgenogram. It is this visibility which actually establishes the quality of the film.

When roentgenograms are viewed with average illumination, the amount of silver remaining in the film emulsion determines the transparency of the images. To be interpretively useful, all densities should allow the passage of at least some light, and if possible, all parts of the images should contain some silver deposits. In other words, a roentgenogram that is processed with the standardized time-temperature method should show some heavy, opaque areas that are known as local overexposures, and some areas where the images are almost totally transparent that are known as underexposures. Large areas of underexposure that are almost devoid of silver and, therefore, of detail, should be avoided, and with average light-box illumination, large areas of overexposure should also be avoided as they, too, are interpretively useless since the extreme density obscures detail.

The density, or color value, is dependent upon the quantity of radiation that reaches the film after passing through the tissues being examined. The amount of primary radiation is controlled by the quantity of current in milliamperes (ma.) flowing through the x-ray tube for a definite length of time in seconds (s.) Because of the absorption characteristics of the tissues, the resulting emergent radiation varies greatly in intensity. It is these varying intensities within the bundle of remnant radiation that produce the various densities that make up the shadow images in the roentgenogram.

Variations in time and/or temperature of development will result in changes in the density of the film, but usually the results are not as satisfactory as when standardized processing is employed. The processing procedure should be considered as a constant, and to obtain the desired degree of density, the ideal would be to change only the kilovoltage. However, because of existing equipment limitations, it is necessary to vary the milliampere-seconds (MAS) also, or in the case of certain fixed kilovoltage dental x-ray units, only the milliampere-seconds.

The over-all density in the roentgenogram is increased by supplemental fog,

Read before the Section on Roentgenology, ninetieth annual session of the American Dental Association, San Francisco, October 19, 1949.

Chairman, Section of Oral Roentgenology, College of Dentistry, University of California.

which is undesirable, and may result from physical and chemical causes. The operator must recognize the presence of various types of fog if a roentgenogram of good quality is to be secured. Fog is defined as a local or generalized shadowing of the image detail by an additional silver deposit. Secondary radiation fog, chemical fog, age fog, dichroic and light fog are the types most commonly found in the finished roentgenogram. Most types of fog, with the exception of secondary radiation fog, can be eliminated for all practical purposes by proper film storage, handling and darkroom processing.

Contrast is defined as the characteristic of the roentgenogram that permits the detection of differences between degrees of density, thereby making image detail fully visible. Optimum contrast is present when the density of the images is such as to reveal all needful detail of the structures being examined. To achieve this, complete penetration of the object is necessary.

Those contrasts that are inherent in the film and developer, plus whatever contrast gradations that may result from changes in the voltage factor, combine to form what is known as the contrast range in the roentgenogram. With the use of standardized time-temperature processing, the operator need be concerned only with the contrast that can be controlled by the kilovoltage. Therefore, in the interest of technic standardization, contrasts that are characteristics of the film and developer can be accepted as constants, and any changes in contrast, so far as this article is concerned, are related only to those changes effected by the kilovoltage factor.

Film contrast may be divided arbitrarily for convenience into two general classifications: short-scale or high contrast, and long-scale or low contrast.

As roentgenographic contrast increases, the difference in color between film densities becomes greater or more abrupt. Densities that represent the thinner dental regions increase and become too dark, to the extent that the image detail is not recorded. On the other hand, images of the thicker regions become totally transparent, and again lose the image detail. This is short-scale or high contrast, and the roentgenogram will show only a short range of intermediate densities.

As contrast decreases, the difference between densities becomes less, and more color steps are apparent throughout the entire roentgenogram. Since the transition between steps is gradual and only small density gradations occur, long-scale or lower contrast is the result in the roentgenogram.

Two dental roentgenograms will suffice to illustrate the two general classifications of contrast. In Figure 1, left, the observer at once notices that because of the outstanding gross features, it is easier to look at but it is difficult to interpret because it lacks image detail. The second roentgenogram, Figure 1, right, is not quite as distinctive as the first. There is a seeming lack of clarity because a greater amount of detail has been introduced into the lower-contrast images. Since the needful detail may seem less apparent, it is necessary to examine the shadow images more carefully.

The assumption might be that the images in the first roentgenogram have sharper definition than in the second, but this is not the case since the same geometric factors were used for both films; that is, the focal spot area of the x-ray tube, and the focal spot-film and object-film distances are the same. Less detail is seen in the first roentgenogram because of the extreme opacities and high lights; while in the second, detail appears throughout the images.

When the image sharpness is maintained by the use of a small focal spot area and extended cone distance, contrast may be reduced appreciably provided it is not less than that required for the best detail visibility, and provided that the

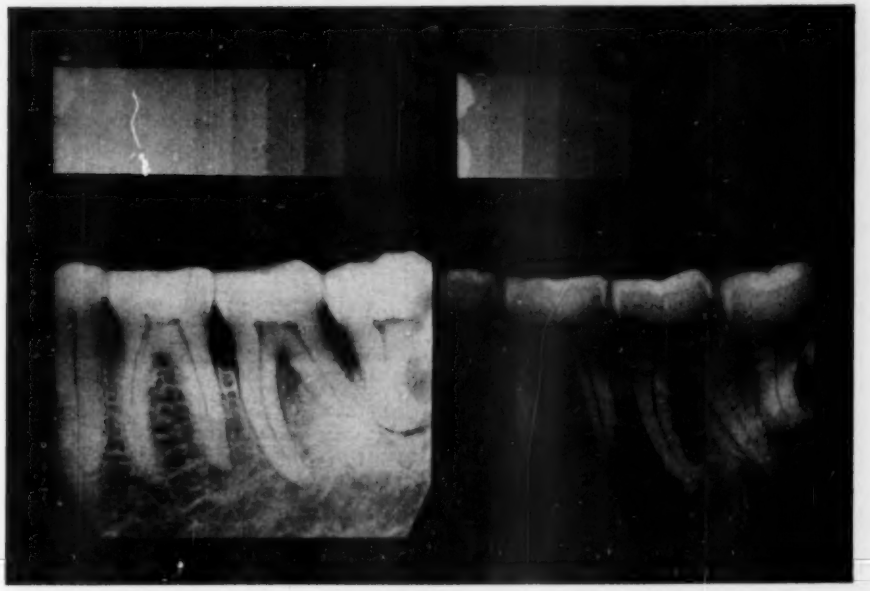


*Fig. 1 • Left: High contrast (short-scale). Right: Low contrast (long-scale)*

number of densities are such that the detail of the various structural elements is shown. The perception of detail in both the soft and hard tissues is greatly improved when contrast is reduced.

To control density and contrast, the factor of penetration (kilovoltage) should be used as the variable whenever possible. It is through the proper manipulation of penetration, in combination with the factors controlling roentgenographic definition, that maximum tissue differentiation may be obtained.

It is also preferable to use kilovoltage as the variable factor because relatively small voltage changes can produce wide changes in roentgenographic density. For example, an increase in 10 kilovolts is approximately equivalent to doubling the exposure time. The absolute energy input is affected relatively little, which makes it possible to maintain a reasonable safety factor for the x-ray tube, and increases the safety dosage limit for radiation to the skin surface.

Roentgen ray wave lengths commonly used in diagnostic roentgenography range from approximately 0.411 A.U. to 0.123 A.U. (only a small portion of the entire roentgen ray spectrum). In dental roentgenography, the objects may be no thicker than 3 or 4 mm., as in the case of the lower anterior teeth, or may be in excess of 2 cm. in various regions of the maxilla and mandible. Average calcification of the jaws strongly absorbs radiation of this sort, and the open spaces in the sinuses, foramens and nasal passages transmit it readily.

When roentgen rays, in traveling their straight-line course, strike an object, one portion penetrates the object, another portion is absorbed and a third portion causes a scattering in all directions from their innumerable points of impact. For all wave lengths, all intensities and every

thickness and density of tissue, all three phenomena occur: transmission, absorption and scattering. However, the quantitative relationship between these phenomena varies considerably with the wave length composition of the roentgen rays and the characteristics of the object.

The roentgen rays generated in the tube are not homogeneous but have a wide, heterogeneous range of wave lengths which have a specific relationship to the applied voltage. The waves which result from lower voltages are long, feebly penetrating and so easily absorbed that they may not even pass through the glass walls of the x-ray tube. Increasing the kilovolt peak (kv.p.) adds new wave lengths, shorter than any present before and correspondingly more penetrating in power.

Dental roentgenography at the University of California College of Dentistry is accomplished with a voltage range of 37.8 kv.p. to 81.5 kv.p., and except for extremes of tissue thickness, any part of the jaws may be roentgenographed at any intermediate voltage within this range. For the thicker regions, however, absorption is excessive at voltages below 55 kv.p., and a film, even to be partly satisfactory, requires dangerously large skin surface dosages (long exposures). For the thinner structures, the total range of tissue differentiation is reduced to narrow limits. The roentgenogram is too dense over all, and differences in density are greatly diminished.

All three roentgenograms in Figures 2 and 3 were made with a constant MAS and a 20 inch cone distance, and with

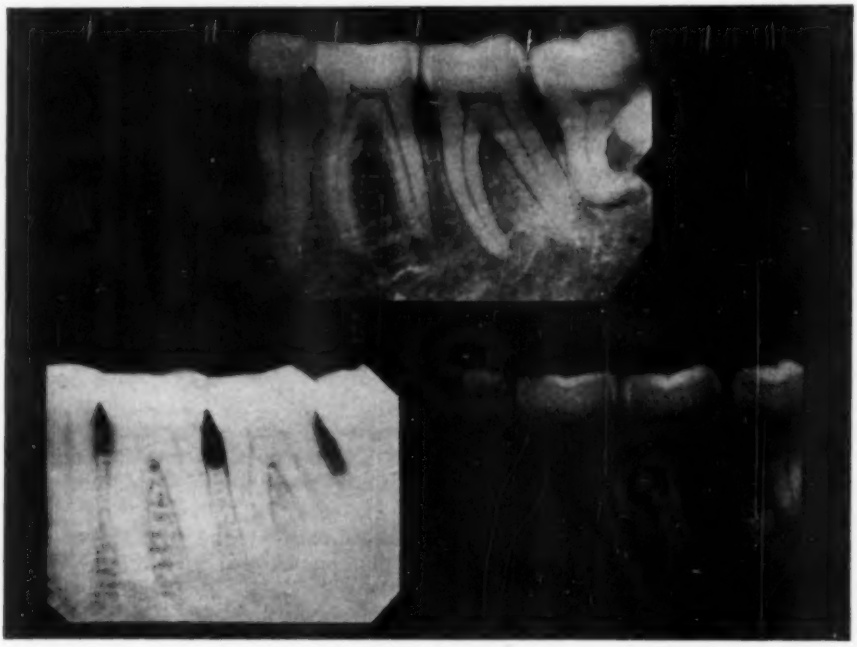


*Fig. 2 • Top: Optimum penetration and good tissue differentiation. Lower left: Underpenetration. Lower right: overpenetration*

identical films and darkroom processing. The voltage factor was varied from 43.5 to 70.3 kv.p. Since the voltage factor was varied, the wave length of the radiation and hence the relative intensity of radiation traveling through the tissues was changed for all three roentgenograms.

In the top roentgenogram, the film is black in the regions of least thickness and density, almost transparent where the thickness and density are greatest, and separated in between by gradations of grey at points of intermediate volume. In other words, the roentgenogram can be considered correctly "exposed."

The left and the right roentgenograms are either too light or too dark. In the left roentgenogram, the absolute intensity was so low that the amount of radiation passing through the thicker portions of the object was insufficient to record detail in the shadow images. The intensity of the radiation striking the film was below its contrast range and, as a result, the film is "underpenetrated." In the roentgenogram on the right, the absolute intensity was so high that the roentgen rays passing through the thinner portions of the object, darkened the film beyond the point where it would record minute intensity differences. In this case, the intensity of the radiation striking the film was above its contrast range and, as a result, the film is "overpenetrated."

The milliampere-seconds (MAS) have no effect upon roentgenographic contrast except in those portions of the roentgenogram that are actually opaque. Milliam-

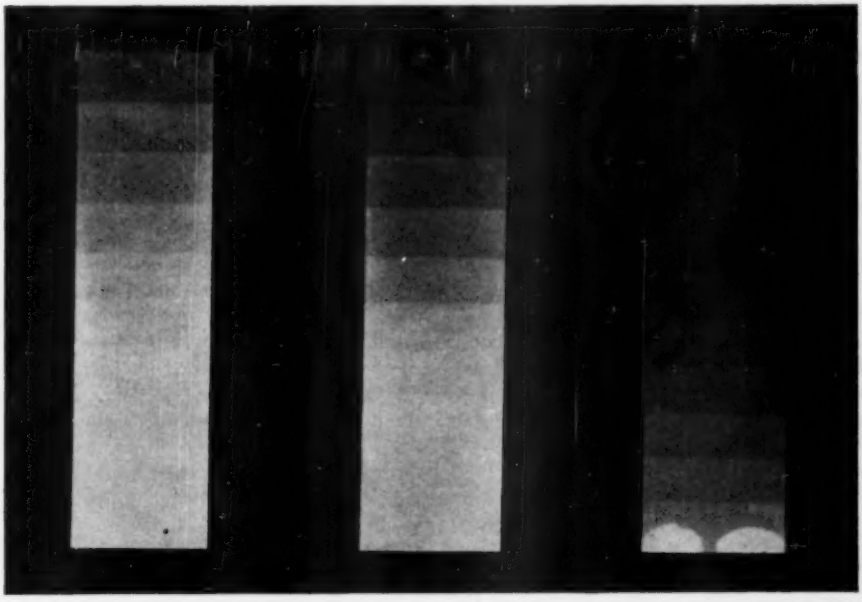


*Fig. 3 • Left: Underpenetration. Center: Optimum penetration. Right: Overpenetration. The copper rivets at the bottom, or thicker end of the penetrometer, are used to represent the roentgenopaqueness of the enamel. The balance of the steps register the relative color of the other dental tissues. This Figure and Figure 2 were made with the same roentgenographic factors*

pere-seconds should be considered as affecting only roentgenographic density and not contrast.

On the other hand, penetration not only has an effect upon density but also upon contrast. When the penetration factor is utilized to change roentgenographic density, the resultant contrast on the film decreases with each increase in penetration; that is, the higher the kilovoltage used, the lower the roentgenographic contrast. It may seem extraordinary to those not familiar with the value of higher kilovoltage technics to advocate a roentgenographic procedure that results in lower contrast. Actually, however, the scale of densities in a high kilovoltage roentgenogram is less abrupt than in a low kilovoltage roentgenogram. The consequent lower contrast in a high kilovoltage roentgenogram allows a greater range of tissue differentiation to be shown. Consequently, a technic producing lower contrast will record detail in both the heavily and more lightly exposed portions of the roentgenogram. The use of high kilovoltage also provides advantages with respect to exposure and definition. Its utilization results in a greater x-ray output from the tube, while the lower energy to the filament permits the use of a smaller focal spot area, and/or a longer focal spot-film distance (cone distance).

The higher kilovoltage roentgenogram with its lower contrast is quite different in appearance from that of the relatively higher contrast dental roentgenogram made with the usual 60 to 65 kv.p. The effects produced are due principally to the manner in which the two types of radiation pass through the tissues. The higher the kilovoltage, the shorter the wave length is, and the more nearly equal the absorption of radiation by all tissues. At low kilovoltages the osseous tissues absorb more radiation than do the soft tissues. This difference is associated more intimately with the atomic numbers of the component elements than with their specific gravity. However, at higher kilovoltages the absorption of roentgen rays is largely governed by the density and thickness of the tissues in their path and is almost independent of the atomic number.

Not only is there a difference in roentgen-ray absorption by osseous and by soft tissues, but there is a distinct difference in absorption between thicker tissues and thinner portions of tissues of the same type, simply because of their relative thicknesses. As a consequence, very slight differences in tissue density are recorded to a greater degree by roentgen rays generated with higher kilovoltages.

Low kilovoltages are used too often in dental roentgenography with resulting unsatisfactory roentgenograms. The many underexposures shown in roentgenograms lack image detail, and interpretation is limited to gross conditions and lesions. An underexposure usually results from the use of inadequate penetration. It indicates that the quality of the radiation lacked sufficient power of penetration to record the detail in the shadow images. The attempt is commonly made to offset the lack of penetration with increased MAS, but usually this is futile because, in spite of excessive exposures, no appreciable quantity of radiation will pass through the object unless the wave length is shortened by using a higher kilovoltage. No practical amount of milliampere-seconds (MAS), therefore, can compensate for an inadequacy in penetration.

In view of the contrast kilovoltage relationship, it should be possible to predict the use of dental x-ray units in the future that will have a rating of 100 kilovolts or more. Higher kilovoltage of this sort should provide still further improvement in showing the optimum range of tissue differentiation in the various dental regions. To date, preliminary experiments have been made using a 1 mm. focal spot, rotating anode tube with better than a 100 kv.p. rating. In comparable films where good densities were achieved, contrast was somewhat reduced in the roent-

genograms, but a greater range of tissue differentiation was recorded. In particular, the line of demarcation of the dentino-enamel junctions was better shown in the roentgenograms made with the higher kilovoltage, and density differences in the images cast by the roots and alveolar bone were slightly less. These improvements were definite, but while the distinctions were readily apparent with average light-box illumination, they could not adequately be reproduced photographically for this article (Fig. 4).

As stated previously, when a bundle of primary radiation penetrates an object, some of the roentgen rays are absorbed, some are transmitted directly through the object, and a considerable percentage is scattered in all directions by striking the atoms of the object, in very much the same manner as visible light is dispersed by fog. These scattered rays comprise what is known as secondary radiation and possess a longer wave length than the primary beam. As it is roentgenographically effective, secondary radiation causes an over-all haziness or fog in the film, overshadowing the images with a supplemental density and obscuring image detail. This results in a loss of good roentgenographic quality. Secondary radiation originates from a multiplicity of sources, and it is not possible to control it completely. However, it should be reduced to an unobjectionable quantity.

Secondary radiation is increased as the wave lengths of the primary beam are shortened. It is also increased when the object is subjected to a larger bundle of radiation. Both factors may produce sec-

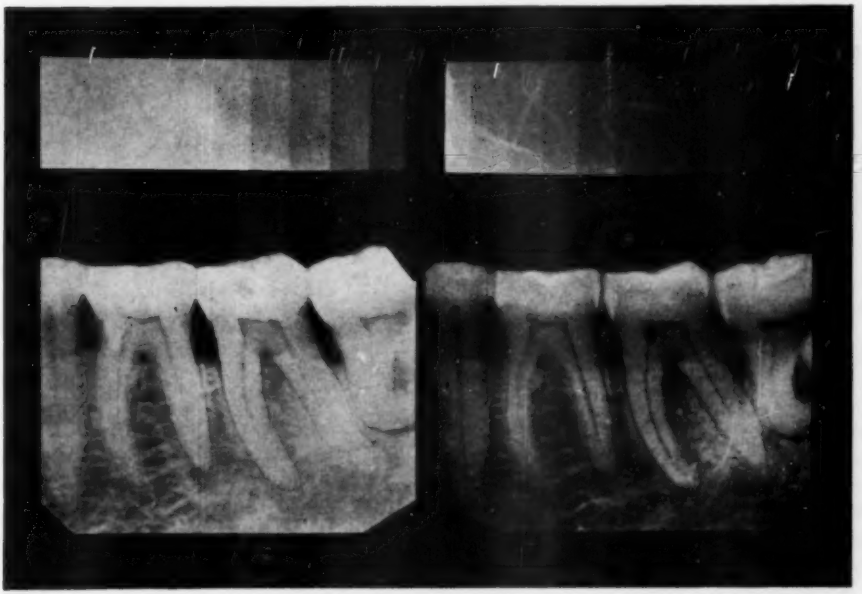


*Fig. 4 • Lower left: High contrast from low kilovoltage. Lower right: Low contrast from extremely high kilovoltage. Maximum tissue differentiation is revealed in the right roentgenogram. This feature is illustrated by the retention of the pencil marks shown on the film of the penetrometer (upper right). The tube surface of the film packet had been lightly marked with a pencil for identification purposes*

ondary radiation of an intensity several times greater than that of the primary beam. The resulting abundance of this unfocused, aberrant radiation exposes the x-ray film and can considerably reduce roentgenographic quality unless effective means for its control are used. Cones, diaphragms and, in some instances, grids are used to minimize secondary radiation to the point where it does not lessen the interpretive value of the roentgenogram. If all the regions of the jaws were comparatively thin, the problem of secondary radiation fog would be a minor item; but since thicker regions predominate, especially in the posterior parts of the jaws, the degree of secondary radiation striking the roentgenogram from all angles must be limited.

The incorporation of a lead backing in the film packet is one means of reducing secondary radiation fog in the film, since the primary beam, upon striking the structures on the side of the jaws opposite to that being roentgenographed, incites an emission of secondary radiation, some of which is directed back toward the packet.

The restriction of the roentgen ray beam to the smallest practical size will reduce the secondary radiation approximately in proportion to the square of the area diameter. This is advantageous particularly for regions of considerable volume and density. With a reduction in size of the bundle of radiation, a definite improvement in contrast will be noticed because there is less secondary radiation affecting the lighter areas in the film. This is particularly true in roentgenography of the posterior dental regions, and in all types of extraoral examinations

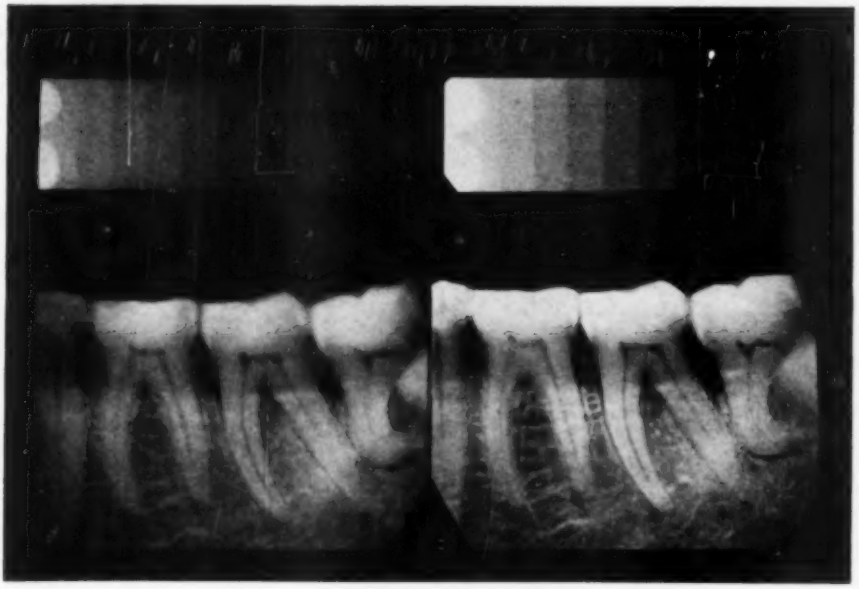


*Fig. 5 • Upper and lower left: Molar region and penetrometer roentgenographed without a cone and diaphragm. Upper and lower right: The same objects roentgenographed with a properly diaphragmed extension cone*

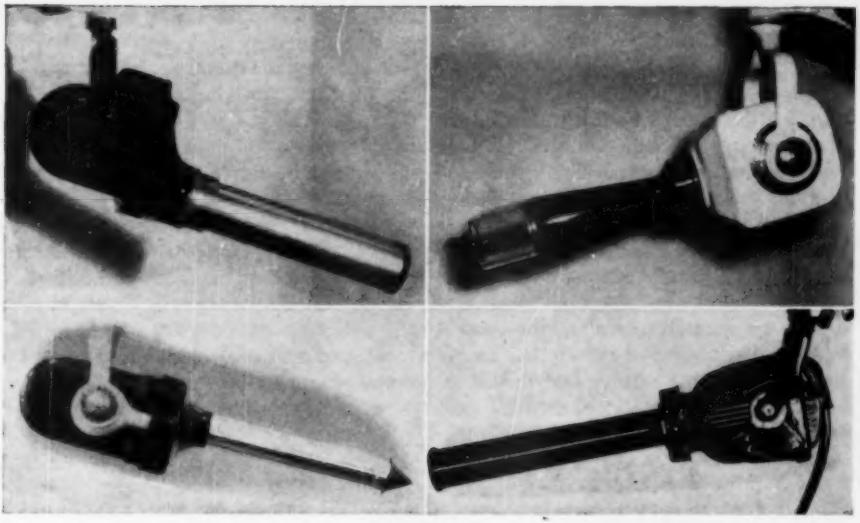


*Fig. 6 • Cones and tubes for use on x-ray equipment to limit radiation*

in which the region of interpretive interest is surrounded by tissues and structures which act as a source of secondary radiation. Figure 5, right, is a roentgenogram made with a properly diaphragmed, extension cone, but with no other means for reducing secondary radiation fog. For comparison, Figure 5, left, is a roentgenogram taken without a cone and proper diaphragming.

Accessory equipment available for radiation area limitation (reducing the bundle of radiation) can generally be classified as cones, tubes and diaphragms. Cones and tubes are, as the names designate, tapered or cylindrical devices of various materials, such as aluminum, brass, copper, or plastic, that are available in a variety of lengths. For dental purposes, their diameters range from 2¾ to 3 inches at the outer ends (Figure 6). Lead diaphragms usually are secured in the base or x-ray tube end of the cone, so that when apertured correctly for their respective cone lengths, the bundle of radiation at the outer end of the cone is just slightly smaller in diameter than the cone itself. As a further aid in reducing secondary radiation, 0.5 mm. of pure aluminum to act as a filter should be incorporated in the dental x-ray unit head as standard equipment.

The use of cones is almost mandatory for all dental regions, particularly those regions of greater volume, and they should always be employed when practical. However, the use of diaphragmed cones makes certain technical factor changes necessary. The smaller the bundle of radiation, other factors remaining constant, the greater the amount of tube voltage required; the larger the bundle, all other factors remaining the same, the less the amount required, since the total film density is proportional approximately to changes in the voltage and the bundle size, which in turn govern the amount of secondary radiation striking the film. In general, it is usually preferable to change the penetration factor to compensate for

the use of cones. This increase, in some dental regions, may be as much as 12 kv.p.

How nearly the ideal dental roentgenogram will be approached, will depend to a large extent upon the dental x-ray unit used. No matter how skilful the operator may be, the technical procedure necessarily will be limited by the adequacy of the equipment. Unfortunately, available so-called "modern" dental x-ray units lack the high intensity output and fine kilovoltage controls that allow the proper recording of all dental tissues and structures regardless of density and thickness. Certain units do have kv.p. controls, but even then, with the exception of one, the kilovoltage steps are too large for proper control of density and contrast.

It is to be hoped that future demand in the profession will be strong enough to induce manufacturers of dental x-ray equipment to provide units with high kilovoltage, so that sufficient penetration is available regardless of density and thickness, or the cone distance employed; an adequate range of kilovoltage, finely controlled so that tissue differentiation is visible under all operating conditions in the various dental regions; and a small focal spot area as a contributing factor in detail sharpness.

*University Hospital, The Medical Center*

# Distortion of wax patterns as influenced by storage time, storage temperature, and temperature of wax manipulation

*Ralph W. Phillips, B.S.,* Indianapolis, and Donald H. Biggs, D.D.S., Evansville, Ind.*

The procedure for making cast restorations has been so perfected in recent years that casting failures must now be considered the exception rather than the rule. The ability to produce routinely smooth, sound, and well-fitting castings does, however, require strict adherence to certain fundamentals. Everything that is done from the time the wax pattern is formed until the restoration is seated in the mouth has a definite effect upon the ultimate clinical result. Not the least important of these variables is the proper manipulation of the wax and the control of any distortion in the wax pattern.

There has been considerable work done on this phase of the casting procedure, originally by Price[1] and Van Horn,[2] later by Maves,[3] Lasater,[4] Volland,[5] and others. In most of these studies, distortion is mentioned and various suggestions are offered for minimizing this common source of error. The results of this work

*Assistant professor and head of dental materials, Indiana University School of Dentistry.

1. Price, Weston A., The laws determining the behavior of gold in fusing and casting. D. Cosmos 53:265 (March) 1911.

2. Van Horn, C. S., Casting: A review and commentary, including a technique. D. Cosmos 53:873 (August) 1910.

3. Maves, T. V., Recent experiments demonstrating wax distortion on all wax patterns when heat is applied. J.A.D.A. 19:606 (April) 1932.

4. Lasater, R. L., Control of wax distortion by manipulation. J.A.D.A. 27:518 (April) 1940.

5. Volland, P. H., Wax patterns for cast gold inlays. J. Nat. Dent. Assoc. 9:569 (July) 1922.

have established certain principles in regard to wax distortion.

All wax patterns, regardless of the method of manipulation, contain a varying degree of internal strain. This strain is induced by (1) the natural contracton of wax on cooling; (2) change in the shape of the wax form by molding, compressing, and so forth; (3) alteration of the pattern by pooling, patching, or carving. This internal strain is held in check by the cavity preparation, but once the confining action of the preparation is removed, the strain starts to be relieved. Release of the strain is a definite function of the length of time during which the pattern is stored, and is influenced by the temperature at which the pattern is stored and any changes of temperature to which the pattern is subjected after it is formed. The longer the wax pattern is allowed to remain off the preparation before being invested, the greater is the release of the internal strain. The resulting distortion continues then until most of the strain has been released. Since higher temperatures raise the flow and lower the yield point of wax, the release of the internal strain is accelerated by any increase in storage temperature.

Most of these factors which influence wax distortion have been thoroughly investigated by the previously cited papers. Although it is common dental practice to allow wax patterns to remain off the preparation for long periods of time before investing, no research has been devoted to studying the effect of time *per se* upon distortion and to correlate such distortion with both temperature and method of wax manipulation. Several men have emphasized the importance of investing the pattern at once[5,6] but no extensive study relative to this factor has been conducted. The primary purpose, therefore, of this study was to determine how long the wax pattern may be safely stored before investing, the best method of storage if the pattern cannot be invested immediately, and the influence of the manipulation temperature of the wax.

## PROCEDURE

Critical dies were employed in the study as the method of detecting and measuring wax pattern distortion. The patterns carved on these preparations, and subjected to the various storage conditions, were cast in hard gold and the resulting castings fitted back on the die. When exacting and critical preparations were employed, even minute distortion became readily evident.

It was, of course, necessary for each casting to be as nearly as possible a replica of the wax pattern. Thus an exacting investing and casting technic had to be perfected until consecutive castings would accurately fit the critical dies. With the casting procedure thus standardized, any discrepancy in fit that might occur in the subsequent tests could be attributed to wax pattern distortion and not to any inaccuracies in the investing or casting procedure. A thermal expansion technic was employed in this study and, since it was standardized throughout, it will not be described at length. A minimum of four castings was made for each particular set of conditions being studied, and if any one casting did not conform to the average, additional castings were made. In all cases, patterns made under ideal conditions, invested immediately, were used as controls. Results depicted in this study represent the average obtained on 436 individual specimens. It should be pointed out that on occasion the degree of distortion was very erratic. However, a sufficient number of castings was always made in each series of tests to obtain a general trend.

An attempt was made in this investigation to have a wide variety of conditions

6. Skinner, E. W., Science of Dental Materials, ed. 3, Philadelphia: W. B. Saunders Company, 1946.

simulated, ranging from the ideal down to the most careless method of manipulating and handling the wax pattern. Construction of the pattern was varied from actual pouring of liquid wax into the die to softening a stick over a Bunsen burner and forcing it into the preparation. The effect of patching and pooling of various areas was also studied. Patterns were stored off the die for various periods of time, ranging up to 72 hours in some tests, with three different storage temperatures being employed. The particular combinations of these conditions have been summarized in tabular form (see table) and each test has been described in detail in the following sections. Kerr's medium-hard inlay wax was used throughout the study.

After the castings had been pickled, they were studied microscopically to detect any small bubbles or nodules that might alter the fit. Only moderate finger pressure was used in trying the castings back on the die and in no case was force used to make the casting fit properly. The accurate casting would, however, slip easily yet snugly into place with light pressure.

## RESULTS

*Effect of Storage Time* • The first series of tests (Test A) were made to determine the distortion as related to the length of time stored, all other variables being controlled. The steel MOD die developed by the Bureau of Standards was used in this test. Its long, practically parallel walls are ideal for emphasizing the slightest inaccuracy. The wax was heated until molten and poured directly into the lubricated die, which was enclosed in a brass cylinder. A plunger and cap were then fitted onto the cylinder and the wax held under pressure as it solidified. Patterns made in this fashion do have the minimum amount of strain. The pattern was then carved flush with the die, carefully removed from the preparation, and stored for various periods of time at room temperature before being invested. The temperature during this time varied from 80° to 86° C. Castings were then made from the patterns which had been stored for the following time intervals (time measured from point when pattern was removed from the die until start of investing procedure): 15, 30, 45, 60, and 120 minutes, 3, 4, 5, 12, 18, and 24 hours. Representative specimens of castings are illustrated in this paper.

It was found that the first evidence of general distortion on this die occurred on patterns which had been stored for 45 minutes. It is true that several individual castings showed a slight distor-

| Test number | Method and temperature of wax manipulation | Storage temperature (Fahrenheit) | Storage time |
|---|---|---|---|
| | Method | | |
| A | Poured | 80-86° | 15, 30, 45 min.; 1, 2, 4, 6 ,8, 24, 72 hrs. |
| B | Molded at 120° F | 80-86° | 15, 30, 45 min.; 1, 2, 4, 6, 8, 24, 72 hrs. |
| C | Molded at 115° F. | 80-86° | 15, 30, 45 min.; 1, 2, 4, 6, 8 24, 72 hrs. |
| D | Poured | 52° | 1, 3, 6, 24 hrs. |
| E | Poured | 36° | 1, 3, 6, 24 hrs. |
| F | Molded at 120° F. | 52° | 1, 3, 6, 24 hrs. |
| G | Molded at 120° F. | 36° | 1, 3, 6, 24 hrs. |
| H | Molded at 120° F. | 80-86° | 6, 24 hrs. |
| I | Molded at 120° F. | 36° | 6, 24 hrs. |
| J | Molded at 115° F. | 80-86° | 6, 24 hrs. |
| K | Patched, molded over Bunsen burner | 80-86° | 24, 72 hrs. |
| L | Patched, molded over Bunsen burner | 106° | 24 hrs. |
| M | Patched, molded over Bunsen burner | 36° | 24 hrs. |

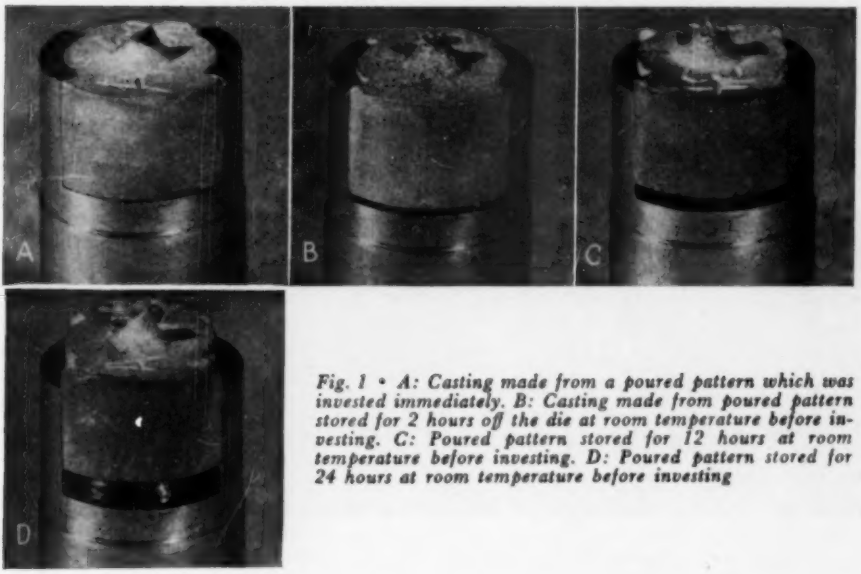



*Fig. 1 • A: Casting made from a poured pattern which was invested immediately. B: Casting made from poured pattern stored for 2 hours off the die at room temperature before investing. C: Poured pattern stored for 12 hours at room temperature before investing. D: Poured pattern stored for 24 hours at room temperature before investing*

tion after 15 or 30 minutes of storage, but distortion was not routinely observed until 45 minutes of storage had elapsed. As the storage time was increased, the distortion became progressively worse. Although most of the distortion occurred during the first six hours, continued changes were noted up to 24 hours. In Figure 1A can be seen the accurate fit obtained on the control casting made when the pattern was invested immediately, while in Figure 1B is a casting made from a pattern stored for two hours. The only variable involved was the storage of the pattern. The distortion is evident. Figures 1C and 1D show even greater distortion when patterns were stored for 12 and 24 hours respectively.

Having established the fact that even the minimum amount of strain present in patterns prepared by use of melted wax is sufficient to produce distortion in a short period of time if stored at room temperature, the next series of tests (B) were designed to determine the degree of distortion which might occur when molded patterns were employed. Plastic wax, of course, is generally used in forming the clinical wax pattern and thus contains considerably more strain than a poured pattern.

In order that the wax could be heated uniformly to a known temperature, the sticks of wax were placed in an electric oven at a temperature of 120° F. The temperature of 120° F. was arbitrarily selected since it is the approximate temperature at which most commercial waxes can be readily molded into the preparation. While the wax was being heated, the steel die was placed in another electric oven held at 99.0 ± 0.5° F. The wax, uniformly heated to 120° F., was then forced into the steel die and held under pressure until chilled. After the patterns had been carved, they were removed from the die, stored at room temperature for the various periods of time noted previously, and invested.

The same results were obtained in this series of castings as found in the previous tests except that the distortion

was greater at each storage-time interval than when the poured wax had been used. In Figure 2A can be seen the degree of distortion occurring after two hours of storage at room temperature. It is evident that the distortion is greater

the work of Lasater,[4] Wylie,[7] and Maves[3] that the higher the manipulation temperature of the wax, the less the strain.

*Effect of Storage Temperature* • Lasater[4] has shown that the release of strain is

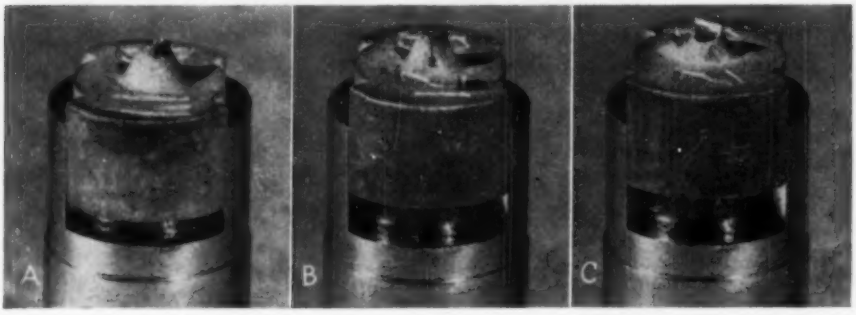



*Fig. 2 • A: Pattern molded at 120° F. stored for 2 hours at room temperature before investing. B: Pattern molded at 120° F. stored for 24 hours at room temperature before investing. C: Pattern molded at 115° F. stored at room temperature for 24 hours before investing*

than that shown in Figure 1B, where a poured pattern was used. Likewise the distortion after 24 hours of storage, Figure 2B, is greater than that in Figure 1D. The increase in strain present in these molded patterns has accelerated the degree of distortion upon storage.

Patterns were also made in which wax heated to 115° F. was molded into the steel die held at 99° F. (Test C). It was found that these patterns, when stored for the various periods of time, exhibited a little greater distortion throughout than when the 120° F. molding temperature was used. For example, in Figure 2C can be seen a casting made from a pattern molded at 115° F. and stored for 24 hours. The distortion is greater than any obtained up to this point in the study. Thus it is apparent that the higher the temperature at which the wax is manipulated, the fewer are the internal strains and the less is the resulting distortion upon storage. This information verifies

accelerated if the pattern is heated to within the general region of the temperature at which it was manipulated. Thus any increase in the storage temperature will produce greater distortion (as will be shown later in this paper). However, since the flow of wax decreases and the yield point increases as the temperature is lowered, it is possible that wax patterns might be stored with more safety at low temperatures. The wax is more stable at lower temperatures and the strain would be more slowly released. This possibility was studied next (Tests D and E).

After poured patterns had been prepared, they were removed from the die and stored in a refrigerator at a temperature of 52° F. for 1 hour, 3 hours, 6 hours, and 24 hours before investing. Other patterns made in the same manner

7. Wylie, W. L., Inlay patterns by the wax gun technic, with observations on physical changes in wax. J.A.D.A. 29:251 (Feb.) 1942.

were stored for these time intervals in the freezing compartment of the refrigerator where the temperature was 36° F. By embedding a thermocouple in a wax pattern, it was found that 8 minutes were required for the temperature of the pattern to rise back to room temperature after its removal from the refrigerator. Thus all patterns were allowed to remain at room temperature for 8 minutes before investing. This step minimized the effect of any dimensional change due to contraction of the wax at the lower temperature.

With all other factors standardized, it was found that patterns stored at 52° F. showed considerably less distortion than those stored for the same period of time at room temperature. In Figure 3A can be seen a casting made from a poured pattern stored at 52° F. for 24 hours. In comparison to Figure 1D where room temperature was employed, the distortion is obviously much less. If the storage temperature is reduced even farther, 36° F., the distortion at 24 hours is at a minimum, as shown in Figure 3B. In fact, the distortion even after 24 hours of storage is less than in those patterns which were stored at room temperature for only two or three hours. Likewise, when castings were made from wax patterns molded at a temperature of 120° F. (Tests F and G), the distortion was less when stored at 52° F. or 36° F. In Figure 3C can be seen a casting made from a pattern stored for 24 hours at 36° F. and the distortion is slight. Patterns made at the other time intervals show the same general trend.

Although the only safe way to prevent distortion is to invest the wax pattern immediately after its removal from the preparation, occasions do arise when the pattern must be stored for a period of time. When this situation does occur, then apparently the best method of storage is to maintain the pattern at a low temperature. Merely cool temperature is not enough better than average room temperature to warrant its use and certainly the common policy of placing the pattern in a cup of cold water and leaving it for prolonged periods of time does not prevent distortion.

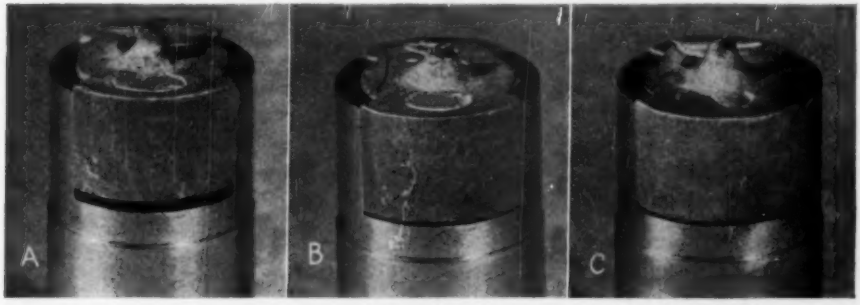



*Fig. 3 • A: Poured pattern stored at 52° F. for 24 hours before investing. B: Poured pattern stored at 36° F. for 24 hours before investing. C: Pattern molded at 120° F. stored at 36° F. for 24 hours before investing*

*Distortion on Other Types of Preparation* • It is recognized that the steel die used in this study is a most critical one and in many respects not comparable to the typical dental preparation. It seems possible that on a less critical preparation much of the distortion evidenced in these

first tests might not be observed. In order to substantiate the results previously obtained, it was decided to repeat these studies making use of a number of different types of preparations made in porcelain teeth. The three preparations used were: an MOD on a molar, MO on a molar, and an MOD on a molar with an extremely thin proximal step and occlusal. This latter preparation was made since it was felt that the distortion might be dependent to some extent upon the thickness of the walls; for example, a thin wall might distort more readily than a thick one.

It will be noted that in some of the following photographs, two small posts have been placed on the occlusal surface of the casting. These wax posts were added to most of these patterns so that a weight could be evenly applied to this surface. Although an attempt had been made in the previous tests to exert the same amount of finger pressure in placing the casting on the preparation, it is difficult to standardize this factor. Thus if the distortion between two castings is slight, the difference might not be detected. The following technic made it possible to determine such minute differences in the fit. The casting was placed on the preparation, enclosed in a tightly fitting metal ring, and a weighted cylinder eased down on the metal posts. Thus, for each casting a uniform force was being exerted in placing the casting onto the preparation.

Anatomy has been only superficially carved on these patterns since accurate reproduction of the occlusal surface is not pertinent. The castings were pickled but were not finished down or polished.

A series of patterns were made for each of the preparations with the wax being manipulated at 120° F. (Test H). Control patterns were invested immediately and castings made to be certain that an accurate fit was routinely obtained when ideal conditions were employed. Other patterns were stored for 6 and 24 hours at room temperature (80-86° F.) before investing. Although distortion was con-

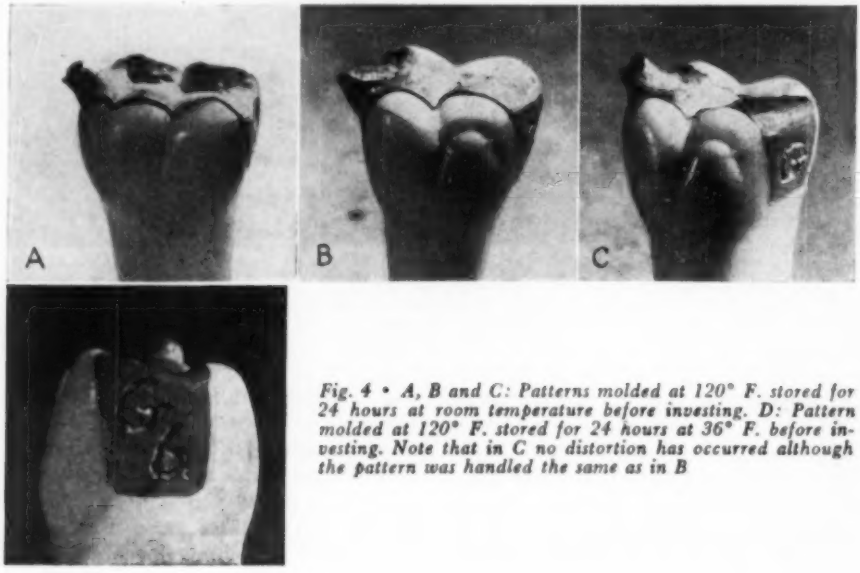



*Fig. 4 • A, B and C: Patterns molded at 120° F. stored for 24 hours at room temperature before investing. D: Pattern molded at 120° F. stored for 24 hours at 36° F. before investing. Note that in C no distortion has occurred although the pattern was handled the same as in B*

*Fig. 5 • Patterns made from wax heated over a Bunsen burner, pooled, patched, and stored for 24 hours at room temperature before investing*

siderably less with all of these castings than with those made on the steel die at the same time intervals, distortion was detected both at 6 hours and at 24 hours. A typical example is seen in Figure 4A, where a casting was made from a pattern stored for 24 hours. Although the distortion is not great, it has been sufficient to produce an inlay failure. Another MOD preparation with longer walls is shown in Figure 4B. This casting also was made from a pattern stored for 24 hours.

These photographs are representative of the general trend on many individual castings. However, the results can be quite erratic on any one particular casting. For example, in Figure 4C can be seen another casting made for an MOD preparation in which the pattern was stored for 24 hours. In this case, accurate casting has been obtained. This example is, however, the exception and not the rule. Other investigators have pointed out that distortion is unpredictable with no two tests for distortion ever coming out exactly the same.[8,9] It could be anticipated that the release of internal strain would not take a definite pattern and the resulting distortion might be quite unpredictable. As stated previously, results presented in this paper are the average of many individual castings and isolated specimens may behave quite differently.

When patterns molded on these preparations at 120° F. were stored at 36° F., distortion was seldom evidenced (Test I). A typical example appears in Figure 4D, which shows a casting made from a pattern stored 24 hours.

Patterns also were molded at 115° F. and then stored at room temperature for 6 and 24-hour intervals. The results were comparable to those obtained when the steel die was employed with wax manipulated at this temperature. The distortion was slightly greater and decidedly more erratic than when wax molded at 120° F. was employed.

*Effect of Patching and Uncontrolled Manipulation Temperature* • Up to this point in the study, care had been exercised to minimize the internal strain by employing a known, uniform manipulation temperature for the wax, reducing carving to a minimum and eliminating any pooling or addition of wax to the pattern. Thus these patterns have been more or less the ideal in terms of residual strain. Unfortunately, wax patterns made in the typical dental office often cannot be fabricated in such a regulated manner. The wax is usually heated, unevenly,

8. Moyes, T. W., Recent experiments demonstrating wax distortion on all wax patterns when heat is applied. Illinois D. J. 2:45 (Oct.) 1932.

9. Washburn, K. C., Inlay wax and its manipulation. Illinois D. J. 16:409 (Oct.) 1947.

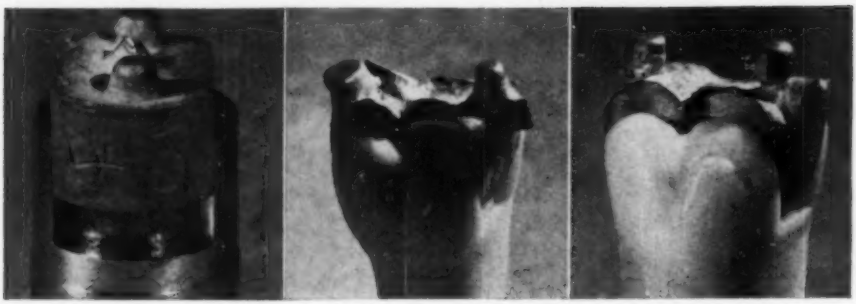


*Fig. 6 • Patterns made from wax heated over a Bunsen burner, pooled, patched, and stored for 24 hours at 106° F. before investing*

over a Bunsen burner at widely varying temperature ranges. Patching of various areas is routinely done, thus introducing still more strain. Undoubtedly patterns produced in this manner contain a much greater amount of strain than those made by the methods employed in this study. Distortion on patterns made in the conventional manner was studied in the next series of tests.

Wax was heated over a Bunsen burner until it was felt to be at the proper molding temperature. The wax was then forced into the cavity preparation, enclosed in a matrix band, and held under pressure until chilled. Before carving, different areas of the pattern were pooled and patched. The pattern was then removed from the preparation and stored at room temperature for 24 and 72 hours (Test K). Control patterns were also made in order to make sure that accurate castings were routinely produced when invested immediately.

Distortion in this series of castings was considerably greater than in the previous tests. In Figure 5 can be seen typical examples of the distortion present on three different preparations after storage for 24 hours.[10] The increased internal strain in these patterns has resulted in great distortion. Patterns stored for 72 hours did not show any increase in distortion. The strain is apparently released rather rapidly, as has been shown in the previous tests.

When the storage temperature is in-

10. Letters used on these patterns do not necessarily correspond to the test numbers employed in this paper.

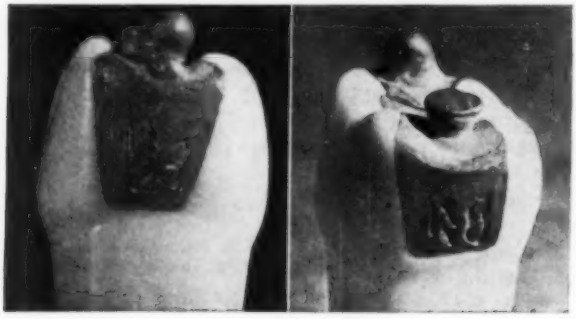


*Fig. 7 • Patched and pooled patterns stored at 36° F. for 24 hours before investing*

creased, the distortion is, of course, accelerated. A series of patterns, made in the manner described, were stored for 24 hours at a temperature of 106° F. (Test L). As the storage temperature is raised closer to the manipulation temperature, the release of strain is more rapid, resulting in the tremendous distortion seen in the three castings shown in Figure 6. Distortion is much greater than when the patterns were stored at room temperature for the same period of time. The results of these tests emphasize the danger that can arise if the conventional wax pattern is allowed to remain off the preparation, particularly at elevated temperatures such as adjacent to an oven or Bunsen burner. If, however, the patterns are stored at a low temperature, release of the strain is retarded and seldom is distortion evidenced. This fact had been demonstrated in the previous tests and was verified again with these patterns which contained much more internal strain. A series of patterns were also stored in a refrigerator at 36° F. for 24 hours (Test M) and the average type of casting obtained is shown in Figure 7. If storage of the pattern is a necessity, the only safe way is to use a low storage temperature.

It should be noted that throughout these latter tests no correlation could be established between the degree of distortion and the particular type of preparation. For example, the long, thin-walled patterns did not necessarily distort more than the more simple, short, bulky type of pattern.

## CONCLUSIONS

Results on 436 individual castings indicate that if distortion of the wax pattern is to be prevented, the pattern must be invested immediately after removal from the preparation. Most of the distortion occurs during the first 2 or 3 hours of storage off the preparation and is often evident on some types of preparations within 30 minutes.

It was found that the higher the temperature of the wax during manipulation, the less the internal strain and distortion upon storage. Distortion is accelerated as the storage temperature is increased. Patterns which have been molded in wax at non-uniform temperature and subjected to patching and pooling display the maximum distortion. If storage of the pattern is necessary, a low temperature will reduce the degree of distortion.

*1121 West Michigan Street*

*Environment and Human Relations* • It has become clear to all of us that if man does not solve the problem of building an environment in which the human personality can grow, the mental strains of maladjustments may become so great as to destroy him. Already there are many indications that mental illness in its various forms is seriously affecting an increasing proportion of our population. Since most of these strains arise from dissatisfying relationships with others, the problem becomes more important as the world grows smaller and the interactions among people increase. *Ralph H. Ojemann, "An Integrated Plan for Education in Human Relations and Mental Health," The Journal of School Health 20:99, April 1950.*

# Excessive citrus juice consumption. Clinical observations of its effect on superficial and deep tissues of the oral cavity

*Henry Hicks, D.D.S., Greenwich, Conn.*

The beneficial effects upon connective tissue and bones, of citrus fruits because of their vitamin C content, have been known for some time.[1] This report is not intended to be contrary to the findings of investigators regarding the beneficial effects of "moderate quantities" of citrus fruits upon connective tissue. "Moderate quantities" is emphasized advisedly, since normal requirements for the vitamins are not known exactly and there are individual variations of need among people in normal health.

Since normal requirements of vitamins are not known, the quantity of citrus fruit to be consumed to provide the normal amount of vitamin C also is not known. Any figure suggested must include a substantial factor of safety to afford protection. The amount of vitamin C necessary to prevent scurvy is about 30 mg. daily,[2] whereas the basic requirement is about 50 or 60 mg. and as much as 100 mg. or more is suggested for optimum nutrition and buoyant health.

According to the above recommendation for vitamin C requirements, it is then necessary to consume from one to three, or possibly four, oranges per day and, since citrus fruits also contain assimilable sugar, citric acid and citrates, more than one orange per day would seem to be excessive.

There has been a popular belief during the last two decades that ingestion of large quantities of citrus fruit juices is healthful. However, there is the question whether, in an attempt to meet adequately the requirements of vitamin C, excessive ingestion of citrus fruits can cause harmful side effects to the deep and connective tissues of the oral cavity.

Stafne and Lovestedt[3] report that there may be local harmful effects from the continued ingestion of excessive amounts of citrus fruits. They say:

> (1) The teeth may be hypersensitive to thermal changes and hygroscopic substances. This may be the major complaint and is often the patient's primary reason for seeking the services of the dentist. . . . (3) Defects in enamel produced by action of acid solutions usually have rounded margins while, in contrast, defects produced as a result of mechanical wear only have sharper margins. (4) A finding which probably is of the greatest diagnostic value is the presence of fillings which project above the surfaces of the tooth.

The experience of the present author substantiates the findings of Stafne and Lovestedt. However, their findings, together with those of men such as Miller,[4] McClure,[5] West and Judy,[6] all seem to

1. Bodansky, Meyer, Introduction to Physiological Chemistry, ed. 4. New York: John Wiley & Sons, Inc., p. 594.

2. Council on Dental Therapeutics, American Dental Association, Accepted Dental Remedies, ed. 14, Chicago: American Dental Association, 1950.

3. Stafne, E. C., and Lovestedt, S. A., Dissolution of tooth substance by lemon juice, acid beverages, and acids from some other sources. J.A.D.A. 34:584 (May) 1947.

4. Miller, W. D., Experiments and observations on the wasting of tooth tissue variously designated as erosion, abrasion, chemical abrasion, denudation, etc. D. Cosmos 49:225 (March) 1907.

5. McClure, F. J., Destructive action, in vivo, of dilute acids and acid drinks and beverages on rats' molar teeth. J. Nutrition 26:251 (Sept.) 1943.

6. West, E. S., and Judy, F. R., Destruction of tooth enamel by acidified candies. J. D. Res. 17:499 (Dec.) 1938.

provide conclusive common evidence that local topical destruction of the tooth material can follow continued ingestion of citrus fruits if consumed in excessive amounts.

The following reports of clinical cases observed over a period of fifteen years suggest that, besides the local topical destruction of tooth material, there is a possible element of harm to the deeper connective tissues and bony process of the oral cavity, as well as other general systemic evidence of damage.

CASE 1

On September 10, 1932, examination of a white patient, 35 years of age, showed him to have a full complement of 32 teeth in normal occlusion. A proximal inlay was present on the upper right first bicuspid and an occlusal inlay was present on both lower right and left first molars. The oral cavity was not free from calculous deposits, but had been immaculately kept.

The patient stated that for the past three years or so, he had consumed 8 ounces of orange juice daily between breakfast and lunch, and weekly had consumed several whole oranges with salt, and fruit salad containing orange and grapefruit, as well as green mixed vegetable salads. His diet had been well balanced in regard to protein, carbohydrates and fat.

The patient complained of a burning sensation of the gingivae, which were markedly swollen, red and puffy and showed no stippling. The gingivae bled profusely on slightest pressure from brushing, touching, or sucking. The teeth were hypersensitive and there was definite sensation on mastication of such material as apple skins and celery. The patient had suffered from hives for approximately the past two years. The teeth were mobile and there was roentgenographic evidence of alveolar resorption (Fig. 1).

*Treatment and Results* • For one month starting September 10, 1932, citrus fruits were eliminated from the diet completely. The patient consumed approximately two quarts of water daily, and large quantities of cabbage, green peppers and other vegetables rich in vitamin C. Apart from this there was no other change in dietary factors. No dental prophylactic treatment was performed during this time.

By September 25, or at the end of the first two weeks of treatment, all redness, swelling, puffiness and profuse bleeding had disappeared. Other acid fruits and vinegar dressings were then eliminated from the diet and at the end of another month, November 10, 1932, all the oral tissues, hard and soft, had returned to normal and the hypersensitivity had disappeared. The patient then started taking two oranges per week and on the days without oranges taking fresh fruits or stewed fruits. After fifteen years of this regimen, no additional cavities were found and there was no recurrence of the gingival condition. All the teeth were firm and alveolar resorption had stopped. Roentgenograms (Fig. 1) showed that the alveolar process had regained its normal characteristics.

CASE 2

On June 6, 1946, a white woman, 37 years of age, came to this office for dental care, with the complaint of great sensitivity of the teeth to air and to contact on brushing. She was found to have a full complement of normal, good translucent teeth. The third molars of both sides were absent and there were five inlay restorations in the mouth. Bite, occlusion, and alveoli were normal and the gingivae were pink and firm.

During the previous six months the patient had been undergoing treatment for asthma by her physician, who had advised her to drink 8 to 16 ounces of citrus fruit juice daily, and it was dur-

ing this period that her teeth had become hypersensitive. In the upper jaw, all the cervical regions of the anterior teeth and the left bicuspids and molars showed abrasion and denudation of enamel. Several deep, transverse grooves appeared on the labial surfaces of the anterior teeth, so that jacket crown restorations were considered. The gingivae were very red and bled profusely.

*Treatment and Results* • All citrus fruits, tomato juice and pineapple juice were eliminated from the diet for two months. At the end of two months, September 1946, all hypersensitivity of the teeth had disappeared, with the result that cervical fillings could be placed without undue discomfort. All gingival redness disappeared and the tissues appeared firm and normal. The patient was then allowed two or three sliced oranges per week, with other sweet fruit on the intervening days, and there was no recurrence of sensitivity. Two years later, on June 3, 1948, there were no additional cavities despite the limited consumption of citrus fruit.

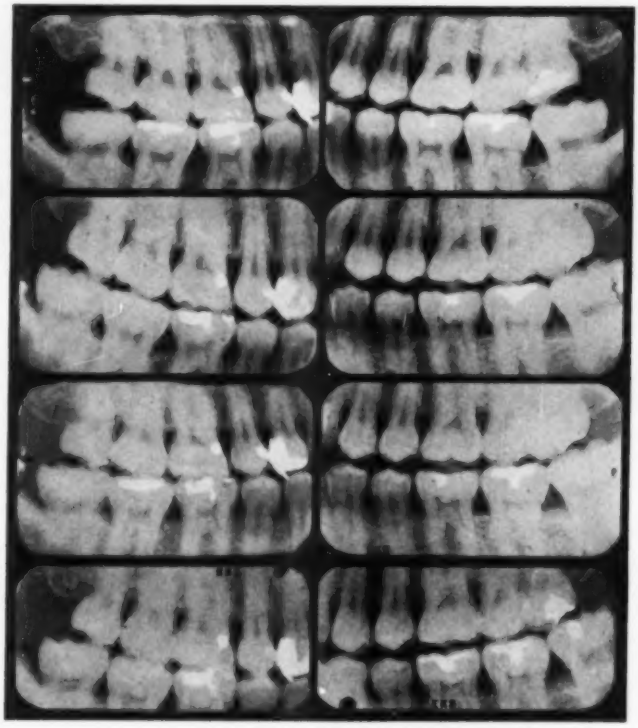



*Fig. 1 • Case 1. Sept. 10, 1932: Evidence of resorption between second and third molars of both sides, upper and lower, and at mesial aspect of lower right second molar. March, 1938: Evidence of resorption has disappeared; alveolar process appears normal and there is no evidence of caries. July 22, 1941: Alveolar process appears normal; no evidence of caries. October 21, 1948: Alveolar process still appears normal. First sign of caries on mesial surface of upper left second molar may be due to lack of attention*

CASE 3

On May 24, 1947, a white man, 53 years of age, came to this office complaining of dizziness, buzzing in the right ear and constant headaches. He had consulted an ear specialist, but the latter had found no evidence of auditory disturbance and had prescribed no treatment. The patient complained of constant tiredness. His facial color was yellowish. He stated that for the last two years he had consumed large quantities of citrus fruit juice daily (8 ounces at breakfast and sometimes additional quantities later in the day).

Examination of the mouth revealed that the patient wore partial dentures to replace posterior dentition in both upper and lower jaw, and that the remaining teeth, mostly in the anterior part of the mouth, were loose. This was especially true of the upper lateral incisors and the lower right second and third molars. A periodontal abscess and labial fistula were present over the upper right lateral incisor.

*Treatment and Results* • Citrus fruit was completely eliminated from the diet and vitamin C tablets, 50 mg. per day, were substituted. The teeth were completely scaled, special attention being paid to the lateral incisors and the molars. Except for the scaling, using a solution containing one part of phenol, 2 parts of aconite, 3 parts of iodine and 4 parts of glycerine by volume, no special treatment was given for the abscess over the upper right lateral incisor.

Two weeks after the start of treatment, the headaches and dizziness had disappeared. On June 27, 1947, one month after the start of treatment, the buzzing in the right ear had disappeared. On September 6, 1947, three months after the start of treatment, the pockets and the labial fistula had disappeared. At the end of eight months of treatment, February 21, 1948, the teeth were firm and the yellowish pigmentation of the skin had disappeared. After a period of a year and one-half, January 1, 1949, during which he followed the same dietary treatment, the patient had fully recovered.

CASE 4

On October 7, 1947, a white woman, 73 years of age, came to this office for routine dental care.

Examination of the mouth revealed damage typical of that described by Stafne and Lovestedt.[3]

All the occlusal and buccal fillings were found to project above the surfaces of the teeth "island-like." The abraded enamel margins were well rounded and in the majority of the areas the dentin was exposed and hypersensitive. In addition, the gums were hyperemic with intense redness and profuse bleeding. The patient stated that for about the past fifteen years she had consumed daily large portions of fruit salad containing orange and grapefruit sections, apples, pears, grapes, peaches and lettuce, as well as 8 ounces daily of orange or tangerine juice or sometimes tomato juice.

The patient was a naturalist, highly intelligent regarding matters of diet and nutrition, and possessed scientific knowledge of soil and fertilizers. When told of the possible cause of the hyperemia and profuse bleeding of the gingiva, she willingly offered help in finding the cause.

*Treatment and Results* • Since the fruit salad and citrus juice were both sources of vitamin C, only the citrus juice was eliminated from the diet and no supplementary vitamin C was administered. The patient was instructed to drink large quantities of water. Some of the fillings in the mouth were replaced, especially those on the occlusal surfaces; other fillings required only polishing of the margins.

*Fig. 2 • Case 5. Above and center: Resorption around posterior teeth, June 24, 1947. Center right: Opaque object in pocket between upper second and third right molars, July 10, 1947. Below: On July 7, 1948, all pockets have disappeared and alveolar resorption has ceased. Teeth have become firm*

By November 10, 1947, or one month from the start of treatment, all signs of hyperemia had disappeared and, when a second prophylactic treatment was performed, the tissues were normal and did not bleed. Twelve months later, on November 18, 1948, the condition had completely disappeared and the gingivae were healthy and normal in appearance.

CASE 5

On July 10, 1947, a white man came for routine dental examination and treatment. He was a practicing psychiatrist with an M.D. degree and his oral cavity had been kept immaculately. A complement of 30 teeth was present, in perfect occlusion and normal alignment. There was a beautiful ovoid arch and few fillings.

During prophylactic treatment, it was noticed that there was marked movement of the teeth. Many deep pockets were found and roentgenographic examination revealed marked absorption of the alveolar process in the upper and lower posterior region of the mouth. An opaque object inserted into the pocket revealed the extent of involvement (Fig. 2).

The patient stated that his diet was a normal, well balanced one, and included 8 to 10 ounces of milk daily and a minimum of sweets and pastry. However, for the past ten years he had also consumed 8 to 10 ounces of citrus fruit juices daily together with tomato juice

and other fruit during each week. The physical condition showed lack of vitality.

*Treatment and Results* • All citrus fruits were eliminated from the diet and 50 mg. of vitamin C and 35 grains of Brewer's yeast in tablet form daily were substituted. Prophylactic treatments, including periodontal scaling, were performed at intervals of two, three and four months, for a period of one year. By July 7, 1948, one year from the start of this treatment and the dietary treatment, the teeth had become firm and roentgenograms showed that all the pockets had disappeared (Fig. 2). Alveolar resorption had ceased. The patient was then allowed two whole oranges or one grapefruit per week.

CASE 6

On May 21, 1945, a white man, 55 years of age, came to this office for routine dental care. Examination of the oral cavity showed that the right first and third molars, upper left first and second bicuspids, lower left third molar, lower right second bicuspid and first, second and third molars were missing. There were Class III resorption of the alveolar process determined by roentgenograms, an abscess on the lower left first molar, and a periodontal abscess with a fistula (labial) on the upper left and right lateral incisors. The upper left and right lateral incisors were elongated. The gingivae were bluish in color and swollen. The breath had a slight odor of acetone, but diabetes had been ruled out. The patient was a German refugee with an M.D. degree and had been a practicing pathologist in Berlin until about 1935 when he came to this country. Since his arrival in this country he had consumed large quantities of citrus juices and salads.

*Treatment and Results* • The abscessed lower left first molar and the upper left third molar were extracted. Complete dental prophylaxis was performed. Citrus fruit juices were eliminated completely from the diet. Vitamin B complex in liquid form was prescribed, and a small dish daily of fresh fruit salad containing some citrus fruits was allowed for lunch along with whole wheat bread. In this instance whole wheat bread was used exclusively for all meals.

The lower right bicuspids and molars and the lower left molars were restored with a removable bridge. A crown was placed on the upper right molar with an extension into the bicuspid space. A fixed bridge consisting of veneer crowns on the cuspid and first molar and two bicuspid pontics was inserted on the upper left side of the mouth. Prophylactic treatment was performed at intervals of four, five and six months.

On January 5, 1946, fourteen months from the time citrus fruit juices were eliminated, the teeth were found to be firm, pockets and fistula had disappeared and the soft tissue had regained normal, healthy appearance. The acetone odor of the breath had also disappeared and there was improvement in the patient's physical condition and sense of well-being.

On January 28, 1950, the progress of the resorption of the alveolar process appeared to have stopped. Only two teeth had been extracted up to that time and they were extracted because of the original condition in which resorption was well below the lower third of the root.

CASE 7

A 9-year-old white girl came to this office on June 22, 1948, and on examination it was found that there was a carious condition of every tooth in the mouth, both deciduous and permanent. In some of the molars the nerve was almost exposed. The enamel was very white and chalk-like.

The child, who was chubby, had been unable to sleep well, either at night or in the daytime, had dark circles under the eyes and seemed to be in a state of constant exhaustion. She had had asthma almost all her life and was unable to do much exercise or to go in swimming. She was under the care of an ear, nose and throat specialist, who recommended cauterization of the nasal mucous membrane. Since the asthmatic attacks occurred in both winter and summer, allergy had been ruled out as the causative factor. For eight months preceding her visit to this office, milk and all other dairy products had been eliminated from the diet and 8 oranges per day had been substituted.

*Treatment and Results* • Citrus fruit juices were completely eliminated from the diet and 25 mg. of vitamin C daily were substituted. All dairy products, including milk, were restored to the diet and a daily amount of 15 grains of calcium gluconate was added.

Within two weeks, the child was able to rest and sleep well. The asthmatic condition gradually improved until at the end of one month the symptoms had completely disappeared. One month later (two months from the start of the dietary treatment), the child was able to go swimming with no ill effects. Six months after the start of treatment there had been complete recovery in every respect.

All cavities found at the start of treatment were filled. Some of the less affected decalcified enamel was coated with silver nitrate. By June 1949, the rampant progress of caries seemed to have slowed down considerably since only three minor cavities were found in one year after the start of treatment.

## SUMMARY AND CONCLUSIONS

Over a period of 15 years, observations were made on patients who habitually drank large quantities of citrus fruit juices. Seven cases, out of more than 50 equally striking ones in the author's records, are reported herein, and seem to show that ingestion of excessive amounts of citrus fruit juices causes many systemic effects as well as local effects on the oral cavity.

Citrus fruit is an excellent source of vitamin C, which is necessary for connective tissue repairs. Although the ingestion of citrus fruit in moderate amounts as a source of vitamin C in the diet is not to be condemned, it would seem that more than two or three oranges or one grapefruit per week is excessive, in view of the fact that vitamin C is obtainable from other sources.

The current popular belief that ingestion of large quantities of citrus fruit juices is healthful should be carefully appraised.

*5 Glen Court*

*Fundamentals of Public Health Program* • In the last quarter of a century, service, research, and teaching, have become the three essential components of public health. No health service of a public nature, whether national, state, or local, can be effective if these three fundamentals are not made interdependent in the provision of a total health program that will improve the living conditions of the people and prolong life. *Herman E. Hilleboe, "Service, Research, and Teaching in Public Health," Health News Vol. 26, 2, June 1949.*

# Age determinations on teeth

*Gösta Gustafson, Odont. D., Malmö, Sweden*

Age determinations play a great role within forensic medicine, not only in identification of bodies but also in connection with crimes and accidents. When the subjects have undergone changes so extensive that external characteristics yield no information, the teeth are often the only means of identification. In cases where identity can be determined with the aid of dentists' records and similar data, a separate determination of age is, of course, not necessary, but where such information is not available, determination of age and identity may be very difficult. There are further instances in which isolated teeth are the only clues found to the victim or the criminal in question, particularly in connection with fights in which teeth have been knocked out. For advertising and searching, it may be helpful to know the approximate age of the person being sought.

The difficulties of age determinations are often discussed in forensic medical literature. Smith[1] writes:

> After twenty-five years there is little on which to base an estimation of age. Certain retrogressive changes may aid the diagnosis in later life; but, speaking generally, an opinion as to the age of an adult is more or less in the nature of a guess—aided, of course, by the general knowledge that one acquires by experience in this class of work.

When estimating age within younger age groups Smith uses the eruption of the teeth, and in older groups the degree of calcification of the skeleton.

Various investigators[2,3] have used teeth for age determination. Thoma,[4] describing the age changes occurring in the dental tissues, notes attrition of the enamel, sclerosis of the dentin, denticles in the pulp, deposition of cementum, continuous eruption of the teeth and alterations in the periodontal structures (periodontosis).

However, no attempt has been made to work out a method for more exact determination of the age of individuals by their teeth. At present determinations are made entirely from general impressions of the changes found. The disadvantage of such guesswork is that certain extensive changes lead to an incorrect—usually too high—estimation of age.

In the course of a previous investigation[5] such estimations of age were performed based on a general impression of the teeth and the changes that could be observed. The results were fairly satisfactory, but indicated that attempts ought to be made to devise a definite plan for such determinations.

The aim of this investigation is, therefore, to work out a method for determining the age of an individual by means of his teeth and to show its application in a number of cases.

## AGE DETERMINATIONS BY PREVIOUS METHOD

Certain changes due to age are visible even on the whole tooth as, for example,

From the Department of Dental Histopathology, State Dental Department, Malmö, Sweden.

1. Smith, Sydney, Forensic Medicine, A Textbook for Students and Practitioners, ed. 8, London: J. & A. Churchill Ltd., 1945.

2. Glaister, John J. P., Medical Jurisprudence and Toxicology, ed. 8, Edinburgh: E. & S. Livingstone.

3. Euler, H., Ueber das altern des menschlichen Zahnsystems, Deutsche Zahnärztl. Wchnschr, 43:393 (June) 1940.

4. Thoma, K. H., Oral Pathology, ed. 2, St. Louis: C. V. Mosby Company, 1944.

5. Gustafson, Gosta, Microscopic examination of the teeth as a means of identification in forensic medicine. J.A.D.A. 35:720 (Nov.) 1947.

**Table 1** • Results of age estimations on teeth in series I, made from general impression of prepared tooth under microscope

| Tooth number | Age in years | |
|---|---|---|
| | Estimated | Real |
| 1 | 70 | 64 |
| 2 | 20 | 15 |
| 3 | 35 | 37 |
| 4 | 65 | 58 |
| 5 | 50 | 40 |
| 6 | 55 | 35 |
| 7 | 55 | 48 |
| 8 | 55 | 67 |

the changes at the tip of the root. From teeth of individuals in the lower age groups, it is possible to estimate directly and with fairly great accuracy the age of the person in question. In older individuals, the changes caused by mastication are observed in the form of attrition. Such macroscopic examination is not sufficiently reliable when estimating the age of older individuals. The following investigation is, therefore, performed on microscopic preparations of teeth.

This investigation was begun on ground sections, with an estimation of age made on the basis of the general impression of the preparation, in the same way as the earlier study.[5]

The first series comprised 8 teeth. In all cases, the determination was made without previous knowledge of the age of the tooth in question, the purpose of this experiment being to find out whether an age determination on such a basis was possible.

Examination of Series I (Table 1) showed that it was possible, within certain limits, to determine age from isolated teeth; errors of from 2 to 20 years were made, or an average error of 9 years. It was obvious, therefore, that a more exact method of determination, based on a more detailed classification of the individuals, would be highly desirable.

In Series II (Table 2) the purpose was, first, to find out if it was possible to classify the teeth of individuals into young (10 to 30 years), middle-aged (30 to 50 years) and old (50 to 70 years). Attempts were made to subdivide these groups into periods of 10 years, then into periods of 5 years, and finally to pin down even more exactly the age of the individual.

In spite of the results of these series being comparatively satisfactory, it was still hazardous to make an estimation without having definite comparative standards. This is best illustrated by the examination of tooth number 13. The estimation was here performed with the aid of fairly extensive changes in the attachment of the tooth and taking into account the amount of cement on the tip of the root. Otherwise this tooth

**Table 2** • Results of age estimations on teeth in series II

| Tooth number | Age in years | |
|---|---|---|
| | Estimated | Real |
| 9 | Middle age<br>40-50 years<br>45-50 years<br>48 years | 38 |
| 10 | Old<br>60-70<br>60-65<br>65 | 65 |
| 11 | Middle<br>40-50<br>40-45<br>40 | 51 |
| 12 | Young<br>10-20<br>10-15<br>13 | 15 |
| 13 | Old<br>60-70<br>65-70<br>70 | 38 |
| 14 | Young<br>20-30<br>20-25<br>25 | 13 |
| 15 | Old<br>60-70<br>50-65<br>65 | 53 |

showed very insignificant age changes. Presumably certain changes caused by disease or treatment dominated the picture so that the estimated age was 32 years higher than the real age. Series II (Table 2) showed errors in estimation of from 0 to 32 years, or an average error of 11 years.

## AGE DETERMINATIONS BY NEW METHOD

*Age changes* • Careful examination of the preparations showed that, besides the changes generally taken into account, other changes obviously connected with age also were present. It was therefore deemed necessary to take into account all factors simultaneously, in order to obtain a schedule according to which these changes as a whole could be judged. If the total changes could be expressed numerically, a more exact value would be obtained, insofar as the extensive changes then would balance the less significant ones.

The changes connected with age are the following:

1. Attrition takes place from the wearing down of the incisal or occlusal surfaces due to mastication. This change is seen both macroscopically and microscopically.

2. Periodontosis, loosening of the tooth, or continuous eruption, is characterized by changes in the attachment of the tooth. It is seen both macroscopically and microscopically.

3. Secondary dentin may develop within the pulp cavity, partly as a direct sign of aging and partly as a reaction against pathologic conditions like caries and paradentosis. This change is to be seen only on the microscopical section.

4. Cementum apposition may take place at the root and around it, particularly in connection with paradentosis. It is seen in microscopical section.

5. Root resorption may involve both cementum and dentin. It is seen in microscopical section.

6. Transparency of the root is a transparency of the apical parts of the root which is most visible during the grinding of the tooth but is also visible on the unprepared tooth. This transparency is not to be confused with the transparency seen in the crown of the tooth. The latter is due to caries, attrition or similar changes in the crown. If the preparations are well dehydrated with alcohol and xylene and then dried before being embedded in hard Canada balsam, the transparency of the root will be visible also in the final preparation. This transparency increases with age, and is apparently not very closely related to pathologic conditions or treatment.

The first four signs have been observed by previous authors, but have not been numerically evaluated. As to root resorption and root transparency, these signs have not hitherto been used for this special purpose. Their applicability in this connection will be shown below.

The closing of the root orifice is another good indicator of age. During the time of development, the width of this orifice is in direct proportion to the age of the person. In young individuals it is often possible to make a very exact determination of age solely with the aid of this sign. In such cases, of course, the method discussed below is unnecessary.

*Ranking of the Age Changes* • To estimate as exactly as possible all the changes mentioned each sign was ranked arbitrarily and allotted 0, 1, 2 and 3 points according to degree of development. I do not think a sharper distinction is possible.

In Figure 1 the ranking of the first five changes is shown.

The ranking of attrition (here abbreviated "A") is made so that "$A_0$" denotes no attrition, "$A_1$" attrition lying within the enamel, "$A_2$" attrition reaching the

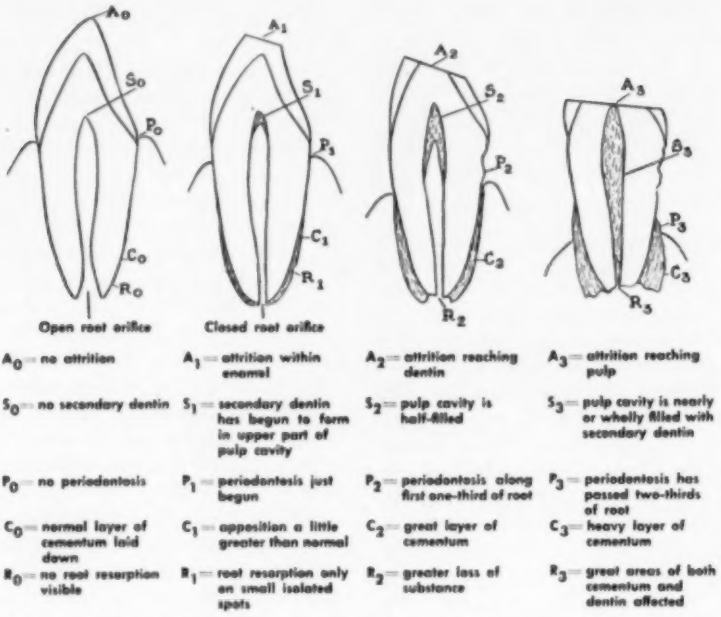

A0
S0
P0
C0
R0
Open root orifice
A1
S1
P1
C1
R1
Closed root orifice
A2
S2
P2
C2
R2
A3
S3
P3
C3
R3
A0 = no attrition
A1 = attrition within enamel
A2 = attrition reaching dentin
A3 = attrition reaching pulp
S0 = no secondary dentin
S1 = secondary dentin has begun to form in upper part of pulp cavity
S2 = pulp cavity is half-filled
S3 = pulp cavity is nearly or wholly filled with secondary dentin
P0 = no periodontosis
P1 = periodontosis just begun
P2 = periodontosis along first one-third of root
P3 = periodontosis has passed two-thirds of root
C0 = normal layer of cementum laid down
C1 = apposition a little greater than normal
C2 = great layer of cementum
C3 = heavy layer of cementum
R0 = no root resorption visible
R1 = root resorption only on small isolated spots
R2 = greater loss of substance
R3 = great areas of both cementum and dentin affected

*Fig. 1 • Shows point values allotted, as a standard for comparison, to age changes in attrition, secondary dentin, periodontosis, cementum, and root resorption, according to degree of development*

dentin, and "$A_3$" attrition reaching the pulp.

Periodontosis is abbreviated "P." "$P_0$" shows no periodontosis; "$P_1$" denotes periodontosis just having begun; "$P_2$," it has passed along the first one-third of the root; "$P_3$," it has passed two-thirds of the root.

Secondary dentin is abbreviated "S." "$S_0$," denotes that no secondary dentin is visible; "$S_1$," that the secondary dentin has just begun to form in the upper part of the pulp cavity; "$S_2$," that the pulp cavity is half-filled; and "$S_3$," that the pulp cavity is nearly or wholly filled with secondary dentin.

Cementum apposition, abbreviated "C," is very difficult to rank. "$C_0$" denotes that a normal layer of cementum is laid down. "$C_1$" is used when the apposition is a little greater than normal. "$C_2$" denotes that there is a great layer, and "$C_3$" that there is a heavy layer of cementum.

Root resorption is denoted "R." "$R_0$" indicates that no root resorption is visible, "$R_1$" that it is found only on small isolated spots. When there is a greater loss of substance it is denoted "$R_2$" and when great areas of both the cementum and the dentin are affected it is denoted "$R_3$."

The transparency of the root (Fig. 2), abbreviated "T," is denoted "$T_0$" when not present, "$T_1$" when noticeable, "$T_2$" when it extends over the apical third of the root and "$T_3$" when extending over the apical two-thirds of it.

When ranking the changes of a preparation, the best method is to compare the changes found with the standards illustrated in Figures 1 and 2.

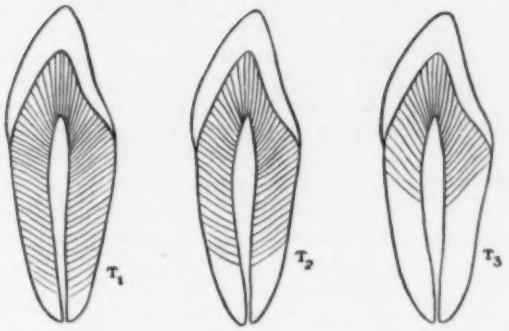

T1
T2
T3
T1 = transparency is noticeable
T2 = transparency over apical third of root
T3 = transparency over apical two-thirds of root

*Fig. 2 • Shows point values allotted, as a standard for comparison, to age changes in root transparency. $T_0$, not shown above, denotes that there was no detectible transparency*

*Point Formula* • When the point values of each age-change are calculated as mentioned above, they are added according to the following formula (which, for purposes of reference in this article, will be referred to as Formula 1): $A_n + P_n + S_n + C_n + R_n + T_n =$ points.

With this classification system, it was possible to make estimations of the changes found in a preparation. In Figure 3 are drawings from preparations from subjects aged 12, 49 and 67 years. The root transparency is not shown. The values of the different changes are noted in points. The formulas for these three subjects were as follows: $A_0 + P_0 + S_0 + C_0 + R_0 + T_0 = 0$ points (12 years); $A_2 + P_1 + S_2 + C_1 + R_1 + T_1 = 8$ points (49 years); $A_3 + P_2 + S_2 + C_2 + R_0 + T_2 = 11$ points (67 years). From these three examples it is seen that increasing age is accompanied by increasing point values.

*Relation Between Point Value and Age* • In order to find out the relation between point value and age, 19 teeth with known age were examined in the way mentioned above. The point values of the teeth were determind and related to the age of the individual. However, the formulas for these teeth are not given here as it was only a preliminary part of the investigation. Instead the results are en-

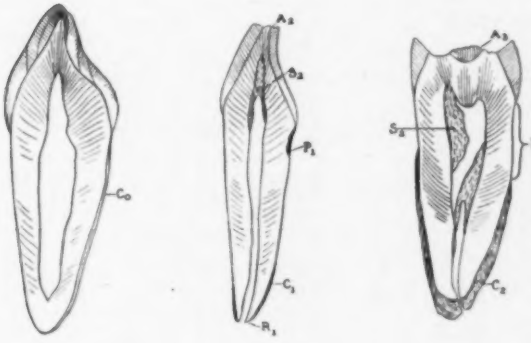



*Fig. 3 • Shows age changes of three teeth classified by point values (root transparency is not shown). Left: $A_0+P_0+S_0+C_0+R_0+T_0=0$ points = 12 years. Center: $A_2+P_1+S_2+C_1+R_1+T_1 = 8$ points = 49 years. Right: $A_3+P_2+S_2+C_2+R_0+T_2 = 11$ points = 67 years*

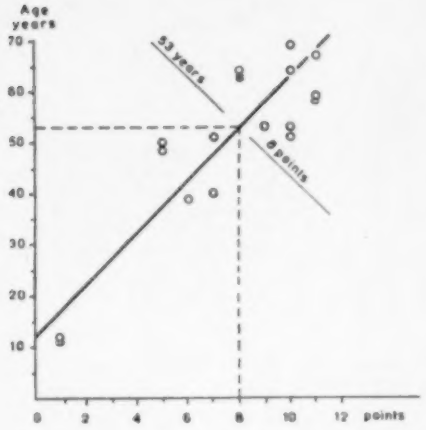



*Fig. 4 • Relation between point value and age of 19 teeth*

tered in Figure 4, where the age is placed vertically and the point value horizontally. For each tooth the relation between point value and age is shown diagrammatically. It was found that an increase in points corresponded to an increase in age, and that it was possible to draw a regression line for the relation between age and points.

*Age Determinations Using Relation Between Point Values and Age* • In order to estimate the age of an individual, the point value for the tooth in question was entered on Figure 4, its crossing with the calculated regression line found, and the corresponding age read off the graph. An example is given in Figure 4 by the dotted line: a tooth was found to have 8 points; the crossing with the regression line gives the age of 53 years.

Certain adjustments were made with regard to the root orifice changes observed before preparation of the teeth. In badly cared for teeth, the point values tended to be higher than in well treated ones, so that the age could not be fairly estimated.

In Table 3 it can be seen that in Series III the differences between estimated and real age were from 1 to 16 years, an average error in estimation of 7½ years. Compared with Series I and II, the differences between estimated and actual ages in Series III were noticeably lower.

Since the teeth in Series I, II and III had been obtained from a public dental clinic, it was possible that some of the teeth were from persons who did not practice good dental care, and this factor might therefore have raised the point values. A series of determinations (Series IV) was therefore made on teeth from a private clinic. On these teeth, a more detailed analysis, before and after grinding, was performed in addition to determination of the point values. The results of these determinations are shown in Table 4. The differences between estimated and real age were 0 to 11 years, or an average error in estimation of 4 years. The good results here are partly due to the estimations made by observing the closing of the root orifice. However, the values estimated by means of Formula 1 also are fairly good.

*Standard Curve of Relation Between Age and Point Value* • The results of using a regression line for estimating the age of the teeth in Series III and IV show that it is possible to determine the age with a high degree of accuracy by

**Table 3** • Results of age estimations on teeth in Series III

| Tooth number | Point values | Age in years | |
|---|---|---|---|
| | | Estimated | Real |
| 16 | $A_3+P_2+S_2+C_2+R_0+T_2=11$ | 65 | 69 |
| 17 | $A_3+P_1+S_3+C_2+R_0+T_2=10$ | 60 | 50 |
| 18 | $A_2+P_1+S_2+C_1+R_1+T_1=8$ | 50 | 51 |
| 19 | $A_2+P_1+S_2+C_1+R_0+T_2=7$ | 45 | 51 |
| 20 | $A_2+P_2+S_2+C_1+R_0+T_2=8$ | 50 | 35 |
| 21 | $A_2+P_2+S_2+C_2+R_1+T_0=9$ | 55 | 39 |
| 22 | $A_2+P_0+S_2+C_1+R_0+T_1=6$ | 42 | 49 |
| 23 | $A_2+P_2+S_1+C_1+R_0+T_1=8$ | 50 | 45 |
| 24 | $A_1+P_2+S_2+C_1+R_0+T_1=8$ | 52 | 55 |
| 25 | $A_1+P_2+S_1+C_1+R_1+T_1=7$ | 48 | 45 |
| 26 | $A_2+P_2+S_2+C_0+R_0+T_1=9$ | 57 | 49 |
| 27 | $A_1+P_2+S_2+C_0+R_1+T_0=6$ | 42 | 28 |

**Table 4 • Results of age estimations on teeth in Series IV**

*Tooth 28.*—First incisor in the upper jaw. Ground buccally (orthodontic treatment?). Apex closed. Resorption on the tip of the root $A_0+P_0+S_0+C_0+R_1+T_0$ = 1 point = less than 20 years. An incisor in the upper jaw has a closed root orifice at about 15 years. Estimated age 17 years. Real age 17 years.

*Tooth 29.*—Upper first incisor. Root exposed ⅓ on one side and ⅔ on the other. Distal caries on the root and mesial caries at the neck. Attrition incisally. $A_2+P_2+S_1+C_0+R_2+T_1$ = 8 points = 53 years. Real age 64 years.

*Tooth 30.*—Upper wisdom tooth. Badly cared for mouth. Root resorbed up to 3 mm. from the neck. Caries in the fissures and mesially. $A_0+P_0+S_0+C_0+R_3+T_0$ = 5 points = 37 years. Real age 37 years.

*Tooth 31.*—Upper wisdom tooth. Apex not closed. About 1 to 2 mm. remain. Slight caries in the fissures. The tooth has been completely erupted. $A_0+P_0+S_0+C_0+R_0+T_2$ = 2 points = about 20 years. Real age 26 years.

*Tooth 32.*—Upper incisor. Apex not entirely closed. About 1 mm. remains. Entirely erupted. $A_0+P_0+S_0+C_0+R_0+T_0$ = 0 points = less than 15 years. Estimated age 14 years. Real age 12 years.

*Tooth 33.*—Upper first incisor. Apex closed $A_0+P_0+S_0+C_1+R_0+T_0$ = 1 point = less than 20 years. Real age 25 years.

*Tooth 34.*—Second upper incisor. Root not entirely closed; almost 1 mm. remains. $A_0+P_0+S_0+C_0+R_0+T_0$ = 0 points = less than 15 years. Estimated, age 10 years. Real age 11 years.

*Tooth 35.*—Upper second molar. Apex closed on the mesiobuccal root. Not closed on the distobuccal and palatinal roots. 1 mm. remains. Filling occlusally. Cavity in the distal pit. Defects of the enamel surface in the forms of dimples. The tooth has been erupted for some time. $A_1+P_0+S_0+C_2+R_0+T_0$ = 3 points. The tooth has obviously been treated orthodontically, so that the attrition is not real but due to grinding. The cement apposition is probably due to treatment. Estimated age 13 years. Real age 11 years.

*Tooth 36.*—Upper wisdom tooth. Apex just closed. Probably not erupted. 0 points = less than 15 years. As this is a wisdom tooth, the age is estimated to be slightly higher or 17 years. Real age 25 years.

*Tooth 37.*—Upper second premolar. Apex not closed. 2 to 3 mm. remain. Has been erupted entirely. Caries slightly more marked distally. 0 points = less than 15 years. Estimated age 11 years. Real age 12 years.

the method here presented; ranking of age changes, their addition into a formula (Formula 1), and estimating age from a regression line of the relation between points and age. In order to make the method as accurate as possible, the estimation has to be made from a standard curve. For this purpose 41 teeth in all were examined (Table 5) and their points calculated according to Formula 1. Teeth from Series I, II, III and IV, together with additional teeth with known age (11 to 69 years), were used. At the examination the age was, however, not known in order to avoid a biased result. From this examination and the resulting regression line (Fig. 5), the accuracy of the method for determination of age may be established.

The regression line was calculated by current formula from the data in Table 1 and the equation (Formula 2) was:

$$y = 11.43 + 4.56x$$

where y = age,
x = points according to Formula 1.
Regression coeff., 4.56 ± 0.16.
Correlation coeff., 0.98 ± 0.01.

*Accuracy* • The average deviation of a value from the regression line ($\delta_y - Y$), *i.e.* the error of estimation, was:

$$\delta_{xy} - Y = \pm 3.63 \text{ years.}$$

This error corresponds to 8.7 per cent of the average, which is a relatively slight error for a biological method, the errors usually being about 10-15 per cent.

That means that an age determination, performed according to the method here described, shows the following deviation from the real age:

| | | | | |
|---|---|---|---|---|
| ± | 3.6 years in | 2 | cases out of | 3 |
| ± | 7.3 years in | 21 | cases out of | 22 |
| ± | 9.1 years in | 99 | cases out of | 100 |
| ± | 10.9 years in | 997 | cases out of | 1,000. |

The same fact may also be expressed in other terms; namely, that the difference between calculated and real age will not exceed:

**Table 5** • Results of age estimations on teeth from Series I, II, III, IV and additional teeth

| Tooth number | Point values | | | | | | | Age in years | |
|---|---|---|---|---|---|---|---|---|---|
| | Per age-change | | | | | | Total | Estimated | Real |
| | A | P | S | C | R | T | | | |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 11 |
| 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 12 |
| 32 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 16 | 12 |
| 14 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 16 | 13 |
| 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 16 | 15 |
| 12 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 16 | 16 |
| 28 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 16 | 17 |
| 39 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 16 | 23 |
| 45 | 1 | 2 | 0 | 1 | 0 | 0 | 4 | 29 | 23 |
| 33 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 16 | 25 |
| 27 | 1 | 1 | 1 | 1 | 0 | 0 | 4 | 29 | 28 |
| 20 | 2 | 2 | 2 | 1 | 0 | 1 | 8 | 47 | 35 |
| 3 | 1 | 1 | 0 | 2 | 2 | 0 | 6 | 38 | 37 |
| 30 | 0 | 1 | 0 | 1 | 3 | 0 | 5 | 34 | 37 |
| 9 | 2 | 1 | 1 | 2 | 0 | 1 | 7 | 43 | 38 |
| 13 | 1 | 1 | 2 | 2 | 0 | 1 | 7 | 43 | 38 |
| 42 | 1 | 0 | 2 | 2 | 2 | 1 | 8 | 47 | 39 |
| 21 | 2 | 2 | 2 | 1 | 1 | 0 | 8 | 47 | 39 |
| 23 | 2 | 2 | 1 | 1 | 1 | 1 | 8 | 47 | 45 |
| 25 | 1 | 2 | 1 | 1 | 1 | 1 | 7 | 43 | 45 |
| 44 | 1 | 0 | 0 | 2 | 0 | 2 | 5 | 34 | 48 |
| 38 | 1 | 0 | 0 | 2 | 2 | 1 | 6 | 38 | 48 |
| 41 | 1 | 1 | 2 | 3 | 2 | 0 | 9 | 52 | 48 |
| 22 | 2 | 0 | 2 | 1 | 0 | 1 | 6 | 38 | 49 |
| 26 | 2 | 1 | 2 | 1 | 1 | 1 | 8 | 47 | 49 |
| 17 | 2 | 2 | 3 | 1 | 1 | 2 | 11 | 61 | 50 |
| 19 | 2 | 1 | 3 | 2 | 0 | 2 | 10 | 56 | 51 |
| 11 | 1 | 0 | 1 | 2 | 3 | 2 | 9 | 52 | 51 |
| 18 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 56 | 51 |
| 46 | 2 | 2 | 2 | 1 | 1 | 1 | 9 | 52 | 52 |
| 43 | 1 | 1 | 3 | 3 | 0 | 1 | 9 | 52 | 52 |
| 40 | 1 | 1 | 3 | 2 | 2 | 2 | 11 | 61 | 52 |
| 15 | 0 | 2 | 3 | 1 | 1 | 2 | 9 | 52 | 53 |
| 24 | 1 | 2 | 3 | 1 | 0 | 1 | 8 | 47 | 55 |
| 47 | 2 | 1 | 1 | 2 | 1 | 2 | 9 | 52 | 55 |
| 4 | 2 | 2 | 2 | 3 | 2 | 1 | 12 | 65 | 59 |
| 29 | 2 | 2 | 1 | 1 | 2 | 1 | 9 | 52 | 64 |
| 1 | 0 | 2 | 3 | 2 | 1 | 1 | 9 | 52 | 64 |
| 10 | 2 | 2 | 3 | 2 | 2 | 1 | 12 | 65 | 65 |
| 16a | 3 | 1 | 2 | 3 | 0 | 1 | 10 | 56 | 69 |
| 16b | 1 | 1 | 2 | 2 | 3 | 1 | 10 | 56 | 69 |

± 3.6 years in 1 case out of 3 = 33 per cent

± 7.3 years in 1 case out of 22 = 4.5 per cent

± 9.1 years in 1 case out of 100 = 1 per cent

± 10.9 years in 3 cases out of 1,000 = 0.3 per cent

The precision of an estimation is increased by examining a number of teeth from the same individual, the error decreasing inversely proportional to the square root of the number of teeth:

| *Number of teeth* | *Error in estimation (years)* |
|---|---|
| 1 | 3.6 |
| 2 | 2.6 |
| 3 | 2.1 |
| 4 | 1.8 |

*Double Determinations* • A method of determining the error of a single examination of a tooth is the method of double determinations; that is, examining each tooth on two different occasions, and computing the difference in points (Table 6), the examinations being made without the observer knowing the real age. Thirty-seven teeth in all were used for this purpose.

Distributions of differences between first and second examination of a tooth (point values):

| Diff. in point value | −2 | −1 | ±0 | +1 | +2 |
|---|---|---|---|---|---|
| Number of diff. | 1 | 7 | 13 | 13 | 3 |

mean difference: 0.27 points ± 0.17

$\delta_d = -1.04$ points

$\delta_s = -0.74$ points

The mean difference between the first and the second examination was 0.27 points ± 0.17, which is not significant and means that there is no consistent difference in points from one time to another.

The standard deviation of the difference ($\delta_d$) was ± 1.04 points, which means that the difference between two examinations was on an average 1 point.

As the mean difference, 0.27 ± 0.17, was not significant, the error in points of a single examination ($\delta_s$), is calculated according to the following formula (Formula 3):

$$\delta_s = \frac{1}{\sqrt{2}} \cdot \delta_d$$

$$\delta_s = \frac{1}{\sqrt{2}} \cdot 1.04 = 0.74 \text{ points.}$$

Thus the error of a single examination is ± 0.74 points or ± 3.37 years,

computed from the standard curve (eq. 2), as 1 point corresponds to 4.56 years, and thus 0.74 points to 0.74.4.56 = 3.37 years.

The precision is increased if a final point value is based on two examinations, in which case the error of examination is $\frac{1}{\sqrt{2}}$.3.37 = 2.38 years.

*Practical Hints* • For investigations as an aid in searching for persons, speed is of very great importance. This precludes the investigation of decalcified sections of teeth as too time-consuming, since at best it takes six to seven days. The microscopical part of the investigation should, therefore, be made on longitudinal ground sections, prepared by grinding on glass from two sides towards the centre of the tooth so that only a thin slice remains. The advantage of this procedure is that it makes possible examination by reflected light during grinding. Such examination of ground sections can be performed within the course of some hours. If, in addition, polarized light is used, it is possible, when several teeth are being examined, to determine whether they are all from the same mouth or from more than one.[5]

As it also may happen that an investigation is not particularly urgent, experiments have been made with decalcified sections, in order to discover whether this method is superior to the former one in which ground sections were used. The advantage of decalcified sections is that changes of the pulp, too, can be observed, whereas they naturally disappear entirely in ground sections. It was found, however, that these cut and stained preparations were of little use for the estimation. It was, for instance, impractical not to have any enamel left. Moreover the changes occurring in the pulp seem to be more variable, and consequently more difficult to interpret, than those occurring in the other dental tissues. There is, on the other hand, a possibility that the quality of the preparations at this investigator's disposal was unsatisfactory. To obtain a good survey of a tooth it is necessary to have preparations without artefacts and with all components undisturbed. However, as has been shown, an examination of decalcified and cut preparations is unnecessary for the present purpose.

In doubtful cases, when the estimation of the different signs is difficult, two estimations (Formula 1) may be made, one with the low values and one with the high ones. For example: $A_2 + P_2 + S_1 + C_2 + R_1 + T_2 = 10$ points = 56 years; $A_2 + P_1 + S_1 + C_2 + R_1 + T_1 = 8$ points = 47 years.

In this case the average value = 9 points = 52 years. The real age was 55 years.

Attrition is easily distinguished from grinding because attrition gives a more even surface.

When dealing with teeth from mouths that have been less well cared for, it is possible that the estimation will be too high. In such cases a small adjustment can be made, but in most cases it is better to use the standard curve.

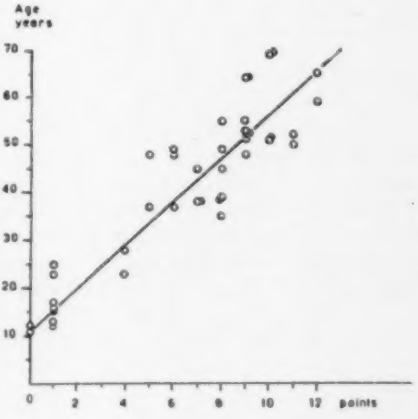



*Fig. 5 • Relation between age and point value of 41 teeth*

**Table 6 • Results of double determinations on 37 teeth**

| Tooth number | Point values | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Second examination | | | | | | | First examination (Table 5) |
| | A | P | S | C | R | T | Total | |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 2 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 1 |
| 12 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 39 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 45 | 1 | 2 | 0 | 2 | 0 | 0 | 5 | 4 |
| 33 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 27 | 1 | 2 | 2 | 0 | 0 | 1 | 6 | 4 |
| 20 | 2 | 2 | 2 | 2 | 0 | 1 | 9 | 8 |
| 3 | 1 | 1 | 0 | 1 | 2 | 0 | 5 | 6 |
| 30 | 0 | 0 | 0 | 2 | 3 | 0 | 5 | 5 |
| 9 | 2 | 0 | 0 | 2 | 0 | 1 | 5 | 7 |
| 13 | 0 | 2 | 0 | 3 | 0 | 1 | 6 | 7 |
| 42 | 1 | 0 | 2 | 1 | 2 | 1 | 7 | 8 |
| 21 | 2 | 2 | 2 | 1 | 1 | 1 | 9 | 8 |
| 23 | 2 | 3 | 1 | 1 | 0 | 1 | 8 | 8 |
| 25 | 1 | 2 | 1 | 1 | 1 | 1 | 7 | 7 |
| 44 | 1 | 0 | 0 | 2 | 0 | 2 | 5 | 5 |
| 38 | 1 | 0 | 0 | 2 | 1 | 1 | 5 | 6 |
| 41 | 0 | 1 | 2 | 3 | 3 | 0 | 9 | 9 |
| 26 | 2 | 2 | 2 | 0 | 2 | 1 | 9 | 8 |
| 17 | 2 | 1 | 3 | 2 | 0 | 2 | 10 | 11 |
| 19 | 2 | 1 | 2 | 1 | 0 | 2 | 8 | 10 |
| 11 | 1 | 0 | 0 | 2 | 3 | 2 | 8 | 9 |
| 22 | 2 | 1 | 2 | 1 | 1 | 1 | 8 | 10 |
| 46 | 3 | 2 | 2 | 1 | 0 | 1 | 9 | 9 |
| 43 | 1 | 2 | 2 | 3 | 1 | 1 | 10 | 9 |
| 40 | 1 | 2 | 2 | 2 | 1 | 2 | 10 | 11 |
| 24 | 1 | 2 | 3 | 1 | 0 | 1 | 8 | 8 |
| 4 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 12 |
| 29 | 2 | 2 | 1 | 0 | 2 | 1 | 8 | 9 |
| 1 | 0 | 2 | 3 | 2 | 1 | 1 | 9 | 9 |
| 10 | 2 | 1 | 3 | 2 | 2 | 1 | 11 | 12 |
| 16a | 3 | 2 | 2 | 2 | 0 | 2 | 11 | 10 |

Those who intend to make estimations of age by this method must work out their own standard curve on the basis of values from many investigated teeth. If the estimation of the degrees given herein is not used, the degrees may be defined and sketched as is indicated in the figures.

The estimation of age on teeth from very young individuals (closing of root orifice) can be performed with the aid of any textbook dealing with this subject.

An estimation of age on wisdom teeth can scarcely be done with pretentions to accuracy.

Any grinding method is useful, provided no valuable parts are lost during grinding.

The degree of periodontosis is best estimated on the unprepared tooth.

## SUMMARY

A method has been worked out for determination of the age of an individual by means of examination of single teeth.

Six features or signs were examined: attrition, periodontosis, secondary dentin, cementum apposition, root resorption and transparency of the root. In some cases the closing of the root orifice was used as an auxiliary sign.

The factors were ranked in points from 0 to 3, the points were entered into a formula (Formula 1), and the sum of points by means of a standard curve then gave the estimated age of the individual.

The standard curve was determined from 41 teeth with known ages, 11 to 69 years.

The method has a high degree of accuracy, the error of estimation being ± 3.6 years.

One of the advantages of the method described is that a number of factors are taken into consideration and that a large, occasional change within a single factor or sign does not essentially affect the result, isolated large changes, which on a rough examination would have denoted a high age, being partly eliminated.

The variations in the determinations are largely due to the fact that different individuals age at different rates, and also to the variability in estimation.

*Tandläkarhögskolan*

# Bacteremia following tooth extraction: prevention with penicillin and N U 445

*Paul S. Rhoads,* M.D., Warren R. Schram,† D.D.S., and Doris Adair,‡ Chicago*

The successful treatment of subacute bacterial endocarditis with massive doses of penicillin marks an important milestone in the therapy of this hitherto almost universally fatal disease. The prevention of endocarditis is of even greater importance. It is with this aspect of the problem in persons with dental infection that the present study is concerned.

The role of foci of infection as the site for the blood stream dissemination of bacteria which eventually were implanted on previously damaged (most frequently from rheumatic heart disease) heart valves was recognized as long ago as 1869,[1] and has since been abundantly confirmed. While a respiratory infection seems to be the precipitating event more often than others, the relation between a tooth extraction and the development of subacute bacterial endocarditis often is more direct. In a series of 53 cases of this disease reviewed at Wesley Memorial Hospital between December, 1941, and August 14, 1948, there was a history of a tooth extraction from a few days to two weeks before the recognition of the initial symptoms in 10 instances. This experience corresponds closely with that of other workers.[2-7]

In experimental dogs Rosenow,[8] by intravenous injection of streptococci cultured from the blood of patients suffering from bacterial endocarditis, produced root canal infection with subsequent apical abscess and eventually endocarditis. Okell and Elliott,[5] Murray and Moosnick,[9] Pressman and Bender,[10] Northrop and Crowley,[11] Glaser and others[12] and Hirsh and others[13] have reported positive blood cultures—usually for *Streptococcus viridans*—in samples taken immediately after tooth extractions in 10 to 75 per cent of the persons tested. The variations in results apparently were due to variations in the condition of the teeth and gums of the different patients and in the

*From the Department of Medicine, Northwestern University, Chicago.

†From the Department of Dentistry, Northwestern University, Chicago.

‡Laboratory technician for Dr. Rhoads.

1. Cited by Hektoen, L., The determination of the infectious nature of acute endocarditis. Arch. Path. 9:540 (Feb.) 1930.

2. Horder, T. J., Infective endocarditis with analysis of 155 cases and with special reference to chronic form of the disease. Quart. J. Med. 2:289, 1909.

3. Billings, F., Focal infection: its broader applications in the etiology of general disease. J.A.M.A. 63:899, 1914.

4. Osler, Henry A., Principles and Practice of Medicine, ed. 14, by H. Christian. New York: Appleton-Century-Crofts Co., Inc., 1942, p. 1031.

5. Okell, C. C., and Elliott, S. D. Bacteremia and oral sepsis with special reference to etiology of subacute bacterial endocarditis. Lancet 2:869 (Oct.) 1935.

6. Burket, L. W., and Burn, C. G.; Bacteremias following dental extractions. J. D. Res. 16:521 (Dec.) 1937.

7. Barnfield, W. F., Subacute bacterial endocarditis and dental procedures. Am. J. Orthodontics (Oral Surg. Sect.) 31:55 (Feb.) 1945.

8. Rosenow, E. C., Study of pneumococci from cases of infectious endocarditis. J. Infect. Dis. P. 411 (March) 1910; Elective localization of streptococci J.A.M.A. 65:1687, 1915.

9. Murrey, M., and Moosnick, F., Incidence of bacteremia in patients with dental disease. J. Lab. & Clin. Med. 26:801 (Feb.) 1941.

10. Pressman, R. S., and Bender, I. B., Effect of sulfonamide compounds on transient bacteremia following extraction of teeth. Arch. Int. Med. 74:346 (Nov.) 1944.

11. Northrop, P. M., and Crowley, M. C., Effect of prophylactic use of sulfathiazole and sulfamerazine on bacteremia following extraction of teeth. J.O.S. 2:134 (April) 1944; Dentist's responsibility in management of patients with rheumatic heart disease. Am. J. Orthodontics (Oral Surg. Sect.) 30:693 (Nov.) 1944.

12. Glaser, R. J.; Dankner, A.; Mathes, S. B., and Harford, C. G., Effect of penicillin on the bacteremia following dental extraction. Am. J. Med. 4:55 (Jan.) 1948.

13. Hirsh, H. L.; Vivino, J. J.; Merril, A., and Dowling, H. F., Effect of prophylactically administered penicillin on incidence of bacteremia following extraction of teeth: results in patients with healed rheumatic and bacterial endocarditis. Arch. of Int. Med. 81:868 (June) 1948.

culture technic used. Practically all workers point out that positive cultures are more frequent in persons with badly infected gingivae and in persons undergoing multiple extractions. Round, Kirkpatrick and Hails[14] studied patients with advanced gingivitis and found that such persons had blood cultures positive for *Streptococcus viridans* and *Staphylococcus aureus* following the chewing of mint candies, when no operative manipulation of any kind was done. Richards[15] demonstrated that massage of inflamed gingivae produced temporary bacteremia. Northrop and Crowley[11] have given sulfathiazole and sulfamerazine prophylactically before tooth extractions. They believed that if enough sulfathiazole was given to make a blood level of 4 mg. per 100 cc. the incidence of postoperative bacteremia could be cut from 16.1 per cent to 5 per cent or less. When the sulfathiazole blood level was less than this bacteremia resulted almost as frequently (14 per cent) as in the unprotected controls (16.1 per cent). With sulfamerazine levels averaging 8.2 mg. per 10 cc. no appreciable effect of the drug in reducing postextraction bacteremia was observed. Pressman and Bender[10] attempted "protection" with sulfanilamide in ordinary doses with little effect in preventing blood stream dissemination of bacteria.

We undertook our study with these objectives in mind:

1. To confirm the contention of other investigators that bacteremia can be demonstrated in a fairly high percentage of persons immediately after teeth extractions.

2. To learn, if possible, which teeth are most likely to cause bacteremia when extracted or traumatized.

3. To determine the effectiveness of penicillin and a new sulfonamide, N U 445 (3, 4 dimethyl-5-sulfanilamido-isoxazole), in preventing the blood stream dissemination and multiplication of bacteria.

From private patients or from the outpatient department of the Northwestern University Dental School 170 blood cultures were done on 129 patients. The extractions were all done by Warren R. Schram at the dental school dispensary or Wesley Memorial Hospital.

Five cubic centimeters of blood were drawn from each patient, and citrated, immediately after extraction. In 27 instances penicillinase, in the concentration of 10 units per cubic centimeter, was added to the blood of the penicillin treated patients, and 0.005 Gm. of paraaminobenzoic acid[16] was added to each cubic centimeter of blood of 20 patients receiving the sulfonamide prophylactically. One cubic centimeter of the sterile citrated blood was added to 9 cc. of sterile 1 per cent dextrose broth (8 Gm. of sodium chloride, 10 Gm. anhydrous dextrose, 3 Gm. of nutrient broth and 1 liter of distilled water). The remaining 4 cc. of citrated blood were added to 20 cc. of cooled but still liquid nutrient agar. After thorough mixing the agar was divided into two sterile Petri dishes. To render one of the plates anaerobic[17] a few cubic centimeters of plain cooled nutrient agar were poured over the congealed blood and agar mixture. While the plain agar was hardening, paraffin was heated until it bubbled. When the paraffin had cooled, a few cubic centimeters were poured on the plain agar and allowed to harden before placing the plate in the incubator. All cultures were incubated for 48 hours before reading and examined daily for five to seven days longer. In some instances

14. Round, H.; Kirkpatrick, H. J. P., and Hails, C. G., Further investigations in bacteriological infections of the mouth. Proc. Royal Soc. Med. 29:1552 (Oct.) 1932.

15. Richards, J. H., Bacteriologic studies in chronic arthritis and chorea. J. Bact. 5:511 (Sept.) 1920.

16. Janeway, C. A., Method for obtaining rapid bacterial growth in cultures from patients under treatment with sulfonamides. J.A.M.A. 116:941 (Mar. 8) 1941.

17. Dick, G. F., Plate method for isolating anaerobes. J. Infect. Dis. 23:578 (Dec.) 1918.

colonies did not appear in the blood cultures until after 96 hours.

Before removing the teeth the gums were dried as thoroughly as possible, painted with 4 per cent tincture of iodine and the operative site blocked off with rolls of sterile cotton. Then under procaine anesthesia the teeth were removed, using all care possible not to contaminate the root apexes of the teeth with saliva. In some instances there was some contamination in spite of the precautions which were taken.

The teeth were placed inside a fold of sterile gauze. The tips of the roots were clipped off with a sterile bone cutter and placed in a sterile mortar. A small amount of sterile white sand was placed in the mortar with the root tip and ground with a sterile pestle, keeping it all covered with a sterile towel. The contents of the mortar were then emptied into the first of six tubes, each containing 9 cc. of 1 per cent dextrose broth. Dilutions were made by introducing 1 cc. of the mixture of the first tube into the second; 1 cc. of the second tube to the third, and so forth. One cubic centimeter of the broth suspension in the first tube was then added to 9 cc. of cooled agar, to which defibrinated sheep blood had been added in 5 per cent concentration. After thorough mixing the contents were quickly poured into a sterile Petri dish. The same procedure was carried out on each of the six tubes. After 48 hours the colonies in the plates containing the various dilutions, 1:10 to 1:1,000,000, were counted and the total bacterial count of the tooth root end thus estimated.

In several instances at the start of the work, in addition to the blood cultures made immediately after extraction, cultures were made 3 hours and 24 hours after extraction but they were usually negative. Hence the routine of making blood cultures immediately after extraction only was adopted. The control group consisted of 59 patients from whom 68 teeth were extracted without preoperative medication. In the protected groups premedication was given two hours before the extraction. Forty-three teeth were extracted after the patients received a single dose of 300,000 units of procaine penicillin in oil intramuscularly, 8 pa-

**Table 1** • Results of blood cultures made immediately after tooth extractions

| | Number | Results |
|---|---|---|
| Control group (no premedication) | 68 | positive—26 (38.2%) |
| Treated group: | | |
| Procaine penicillin in oil 300,000 units 2 hours before extraction | 43 | positive — 3<br>negative —40 |
| N U 445 (sulfonamide) 2 Gm. 2 hours before extraction | 39 | positive — 3<br>negative —36 |
| Buffered crystalline and procaine penicillin, 1:3 aqueous solution, 300,000 units 2 hours before extraction | 12 | positive — 0<br>negative —12 |
| Penicillin (aqueous solution) 100,000 units 2 hours before extraction | 8 | positive — 0<br>negative — 8 |
| Total protected group | 102 | positive — 6 (5.82%)<br>negative —96 |

tients received aqueous penicillin, 100,000 units, intramuscularly. Before 12 more extractions the patients were given single intramuscular injections of 300,000 units of a mixture of buffered crystalline penicillin and procaine penicillin G in the proportion of 1:3 in aqueous solution. Before the extraction of the other 39 teeth the patients were given 2 Gm. of N U 445 orally or intramuscularly as the protecting dose.

N U 445 was chosen for this study because our *in vitro* studies had showed it to be as effective as sulfadiazine against nonhemolytic streptococci and the maximum blood level (average 7.8 to 9 mg. per 100 cc.) for this dose was reached about two hours after administration either intramuscularly or orally. Also we had found no urinary complications with its use in more than 150 cases and considered it safer than other sulfonamides for use with dispensary patients whom we could not observe after its administration. The maximum blood concentration of the procaine penicillin in oil probably was not reached in two hours in every case but it was not found practicable to give the dose much earlier in advance of the tooth extractions in the dispensary patients. In part of the group receiving straight aqueous solution of penicillin or N U 445 as protection, maintenance doses of aqueous penicillin (50,000 units every four hours) and N U 445 (1 Gm. orally every four hours) were continued for 24 hours.

The work was done at irregular times over a two year period with no attempt at selection of any particular cases for protection with penicillin or the new sulfonamide.

## RESULTS

It will be seen from Table 1 that 38.2 per cent of the control unprotected group had positive blood cultures when the blood specimen was taken immediately after tooth extraction, while 5.82 per cent of the protected patients had positive blood cultures. All of the organisms recovered in the blood cultures were nonhemolytic streptococci—alpha, alpha prime or gamma. No further differentiation was attempted. Of the six patients having demonstrated bacteremia in the protected group three had received 300,000 units of procaine penicillin in oil two hours before the extractions; the other three had received 2 Gm. of N U 445 orally two hours before extraction. All of these patients had two or more teeth removed at the same sitting with the exception of one from the penicillin group. One patient in the N U 445 group who had had a positive blood culture after his first extraction was given more intensive treatment prior to his three succeeding extractions. The day before each extraction he was given 6 Gm. (1 Gm. every four hours) of N U 445, orally, in addition to the usual 2 Gm. two hours before the operation, and all of his other blood cultures were negative. Another patient, because of a chronic osteomyelitis, was also given more intensive medication, 1 Gm. of N U 445, orally, every four hours for six days preceding the day of operation. Two hours before removing chips of bone he received an additional 2 Gm. His blood culture was negative.

The quantitative counts of snipped off root ends of 170 of the teeth extracted were done to see whether extraction of the heavily infected ones was more likely to result in bacteremia than extraction of those with lower bacterial counts. In most instances it is impossible to extract a tooth without some mouth contamination. However, in a previous study[18] we had shown that, using the same technic used in the extractions reported here, no vital teeth removed because of trauma or to make way for dentures and in the

18. Rhoads, P. S., and Dick, G. F., Roentgenographically negative pulpless teeth as foci of infection; results of quantitative cultures. J.A.D.A. 19:1884 (Nov.) 1932.

**Table 2** • Bacterial counts of root ends of extracted teeth

| | Less than 10,000 colonies | Bacterial counts between 10,000 and 100,000,000 | | Colonies too numerous to count |
|---|---|---|---|---|
| | | Number | Average count | |
| From 32 subjects with positive blood cultures | 17 (53.12%) | 13 (40.63%) | 6,940,000 | 2 (6.25%) |
| From 138 subjects with negative blood cultures | 88 (63.77%) | 34 (24.64%) | 1,700,750 | 16 (11.59%) |

absence of advanced gingivitis had bacterial counts above 10,000. We consider a count under 10,000 as indicative of little or no serious infection. Counts above this figure may, also, be from contamination alone but usually when figures in the hundreds of thousands or millions are obtained they are associated with other local evidences of infection as seen by direct inspection or in roentgenograms. When more than 100 colonies were seen in the 1:1,000,000 dilutions in our plates the count was listed as "too numerous to count."

In Table 2 it is seen that bacterial counts of the root ends of the extracted teeth from the subjects who had positive blood cultures were not significantly different from those taken from persons whose blood cultures remained sterile. In the 10,000 to 100,000,000 group the average bacterial count was lower in the nonbacteremia group but this was offset by the larger number of "too numerous to count" figures in the same group. Table 3 shows that teeth having large areas of rarefaction at their roots visible in roentgenograms and listed as heavily infected by the oral surgeon had higher bacterial counts and were associated with a higher incidence of postoperative bacteremia than those showing only small granulomas or no changes at all at their roots. But positive blood cultures were by no means confined to the group showing roentgen evidence of apical rarefaction. For instance bacteremia, in spite of procaine penicillin in oil protection, occurred in three patients, the apical bacterial counts being 70, 250 and 285 while the three bacteremias in the N U 445 group were in patients whose extracted teeth had apical bacterial counts of 2,400, 8,075 and 429,600.

Table 4 shows that extraction of more than one tooth (and seldom more than two in our series) at a single operation enhanced the chances of postoperative bacteremia very definitely. In Table 5 it is seen that the presence of extensive

**Table 3** • Comparison of bacterial counts and incidence of positive blood cultures following extraction of teeth showing frank apical rarefaction and those showing minimal root changes

| | Total number | Positive blood cultures | Bacterial counts of snipped-off root ends | | | |
|---|---|---|---|---|---|---|
| | | | Less than 10,000 | 10,000 to 50,000,000 | | Too numerous to count |
| | | | | Number | Average count | |
| Frankly infected Teeth | 15 | 7 (46.7%) | 7 (46.7%) | 5 (33.3%) | 14,342,000 | 3 (20%) |
| Teeth showing minimal or no root changes | 153 | 25 (16.34%) | 96 (62.75%) | 43 (28.15%) | 3,061,616 | 14 (9.15%) |

**Table 4** • Results of blood cultures in relation to number of teeth extracted in the same operation

| | Single tooth extracted | | Two or more teeth extracted | |
|---|---|---|---|---|
| | Blood cultures | | Blood cultures | |
| | Positive | Negative | Positive | Negative |
| Preoperative protection* | 1 | 43 | 5 | 53 |
| No preoperative protection | 12 | 28 | 14 | 14 |

*Protection with: procaine penicillin oil, 300,000 units; penicillin (aqueous solution), 100,000 units; buffered crystalline and procaine penicillin G (aqueous solution), 300,000 units; N U 445 (sulfonamide), 2 Gm., 2 hours before extraction.

gingivitis also increased the incidence both of bacteremia and high bacterial counts in the root ends. But again it must be pointed out that even when advanced gingivitis was not present and only one tooth was removed at a time the hazard of bacteremia was still very great.

In some of the blood cultures not more than one colony was seen on a single plate, in others several colonies. The necessity of using all three types of medium—dextrose broth, aerobic and anaerobic plates—to get an incidence of 38.2 per cent of positive blood cultures in our nonprotected control series is illustrated in Table 6. Had enriched media and media at other pH levels been used an even higher percentage might have been obtained.[5, 12] The anaerobic plate cultures grew more bacteria from the blood than did the others.

Our study was more than half completed before the excellent reports of Glaser, Dankner, Mathes and Harford[12] and of Hirsh, Vivino, Merril and Dowling[13] appeared. In both of these studies the authors emphasized the importance of adding penicillinase to the blood cultures to prevent continuing penicillin bacteriostatic action after the cultures were made. Since our incidence of postextraction positive blood cultures in patients protected with penicillin was much lower than theirs it was suspected that our failure to add penicillinase to the cultures in the first 36 penicillin protected cases might account for the difference in results. Consequently penicillinase in concentration of 10 units per cubic centimeter was added to the next 27 cultures of blood from patients receiving penicillin prophylactically. Since only one positive blood culture occurred in this group as compared to two in the group of 36

**Table 5** • Results of blood cultures in relation to extensive gingivitis

| | Blood cultures | | Total |
|---|---|---|---|
| | Positive | Negative | |
| Advanced gingivitis: | | | |
| Preoperative protection | 2 | 54 | |
| No preoperative protection | 15 | 18 | 89 |
| Minimal or no gingivitis: | | | |
| Preoperative protection | 4 | 41 | |
| No preoperative protection | 11 | 25 | 81 |

**Table 6** • Distribution of positive blood cultures depending upon kind of media used

| | |
|---|---|
| 1 per cent dextrose broth only | 2 |
| Aerobic agar only | 5 |
| Anaerobic agar only | 9 |
| 1 per cent dextrose broth and aerobic agar | 4 |
| 1 per cent dextrose broth and anaerobic agar | 5 |
| Aerobic agar and anaerobic agar | 2 |
| 1 per cent dextrose broth, aerobic agar and anaerobic agar | 5 |
| Total | 32 |

in which penicillinase was not used in the medium it was felt its use had not significantly altered the results.

In the group of 39 extractions in patients receiving N U 445 as protection only 20 of the cultures were made with 0.005 Gm. of para-aminobenzoic acid added to each cubic centimeter of blood. There were two positive blood cultures in the latter group as against a single positive culture in the sulfonamide protected group which did not have this agent added to the culture. Hence the incidence of bacteremia in this protected group may have been higher had para-aminobenzoic acid been used in all of the cultures.

## SUMMARY AND CONCLUSIONS

When blood cultures were made immediately after tooth extraction in a series of 68 patients who received no preoperative bacteriostatic drug, bacteremia due to *Streptococcus viridans* or *Streptococcus anhemolyticus* was demonstrated in 38.2 per cent of the group. A series of 102 cultures were made from 61 patients who received preoperative protection about two hours before tooth extraction. In 43 instances the protection was with 300,000 units of procaine penicillin in oil; 8 with 100,000 units of penicillin in aqueous solution; 12 with 300,000 units of a mixture of buffered crystalline and procaine penicillin G in the proportion of 1:3 in aqueous solution, and 39 with a new sulfonamide, 3, 4-dimethyl-5-sulfanilamido-isoxazole (N U 445) in 2 Gm. doses orally or intramuscularly in 20 per cent saline solution. Three in the group receiving procaine penicillin in oil and three in the sulfonamide group had positive blood cultures. The blood cultures were all negative in the other two "protected" groups. Thus the incidence of bacteremia in the total group receiving bacteriostatic medication before extraction was 5.82 per cent. From the data given the necessity of giving penicillin or sulfonamides preoperatively to patients with active or inactive rheumatic heart disease before tooth extraction is obvious. Since such premedication is usually a simple and, in the absence of drug sensitivity, a harmless procedure it would appear that all patients undergoing extraction of teeth should have such protection. Probably the injection of 400,000 units of the 1:3 mixture of crystalline and procaine penicillin G in aqueous solution—now available in single vials—is the most practical method for office use.

In general bacteremia follows extraction a little more frequently when teeth have large areas of rarefaction at their root ends as revealed in roentgenograms or there is advanced gingivitis, and it is distinctly more frequent when more than one tooth is removed at one sitting. However, the incidence of postextraction bacteremia is sufficiently high when none of these conditions is present to make preoperative protection with penicillin or sulfonamides desirable.

# The effects of a penicillin dentifrice on oral lactobacilli

*Robert J. Fitzgerald,* Ph.D., Bethesda, Md.; Helmut A. Zander,† D.D.S., Boston, and Harold V. Jordan,* B.S., Bethesda, Md.*

Penicillin is known to exert an inhibitory effect on the oral lactobacilli. Hill[1] reported a marked decrease in salivary lactobacillus counts following the use of a penicillin dentifrice and mouthwash. After discontinuance of this regime the counts remained low for a time and then returned to their previous level. The possibility that penicillin-fastness had developed was considered but was not investigated. Thus far no reports have appeared concerning the development of resistance to penicillin by the oral lactobacilli under the conditions of *in vivo* testing. On the other hand we have found it possible to produce penicillin-fastness in a number of human, rat and hamster lactobacillus strains *in vitro* by transferring large inocula of susceptible strains through media containing successively higher concentrations of penicillin.

The disclosure by Zander that an apparent reduction in the incidence of new caries was occurring in a group of school children using a penicillin dentifrice prompted the experiments to be described in this paper. The purpose was twofold: to determine the effect of continuous use of a penicillin dentifrice on salivary lactobacillus counts, and to ascertain whether the use of such a dentifrice would result in an increased resistance to penicillin by the lactobacilli which persisted in the oral cavity.

## EXPERIMENTAL PROCEDURE

Prior to undertaking this experiment some preliminary tests were run to establish the concentration of penicillin needed to inhibit the growth of lactobacilli in saliva samples plated on tomato-juice agar with a pH of 5.0. It was established that a concentration of 1.0 unit per milliliter of sodium penicillin G would prevent the growth of all but a small percentage of the lactobacilli from normal saliva samples. For the experiments to be described this was chosen as the lowest level of penicillin to be tested, since it would provide a positive base-line count for comparative purposes in both the experimental and the control groups.

The details of the experimental set-up for the *in vivo* testing of the penicillin dentifrice have already been described by Zander.[2] The study was conducted in grades 1 to 6 of two elementary schools in Walpole, Mass., with children whose ages at the beginning of the study ranged from 6 to 14 years. Both groups of children were taught to brush their teeth and were given a tooth powder which was identical for both schools except that the one prescribed for the penicillin school contained 500 units of potassium penicillin per gram of tooth powder. This phase of the study included 129 children in the control school and 181 children in the experimental school.

Presented at the Twenty-eighth General Meeting of the International Association for Dental Research, French Lick, Indiana, March 25, 1950.

*National Institute of Dental Research, National Institutes of Health, Bethesda, Md.

†Tufts College Dental School, Boston, Mass.

1. Eastlick, K. A., Dental Caries. St. Louis: C. V. Mosby Co., 1948. p. 103.

2. Zander, H. A., Effect of a penicillin dentifrice on caries incidence in school children, J.A.D.A. 40: 569 (May) 1950.

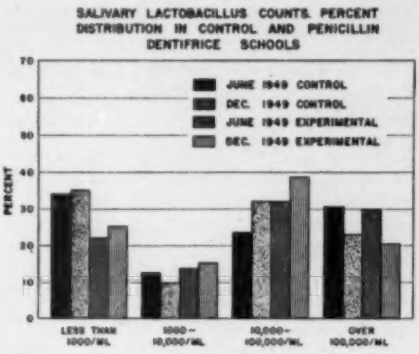
For the lactobacillus counts paraffin stimulated salivas were diluted 1 to 5 in dextrose infusion broth of pH 5.0, and 0.1 ml. samples were spread on tomato-juice agar of pH 5.0. In the case of the experimental (penicillin) school four such plates were inoculated for each child: a control, and also three containing 1.0, 10.0 and 50.0 units respectively of sodium penicillin G per milliliter of agar. For the control school, where the same dentifrice was being used except for the omission of penicillin, two plates were made for each child: a control and one containing 1.0 unit of penicillin per milliliter of agar. The plates and broth dilutions were incubated for four days at 37° C. Gram stained smears were made of the broths from samples which were negative for lactobacilli on the plate counts to determine if any lactobacilli were present.

Two sets of counts were made, the first in June 1949 when the children had been using the dentifrice for a year and a half, and the second six months later in December 1949. The June samples were plated within three hours after collection and the December samples were expressed by air to Bethesda. These latter samples were kept refrigerated and were plated approximately 48 hours after collection.

Use of the dentifrices was purposely omitted on the morning of the day on which salivas were collected.

## RESULTS

In the control school there were 129 children for whom lactobacillus counts were made in both June and December of 1949. In the experimental school there were 181 such children. The results of the lactobacillus counts made in June and December for both groups of children appear in the figure, in which distribution of the counts for each school and each collection period is graphically depicted. In addition to the data




in this figure, percentages of plates negative for lactobacilli were found to be 21.4 and 18.8 per cent for the control and experimental schools respectively in June, and 17.7 and 20.8 per cent respectively in December. It is obvious from these data that after the penicillin dentifrice had been in use for 18 months or longer there were no differences in the lactobacillus counts which could be ascribed to its use.

In order to determine whether the failure to observe a change in lactobacillus counts was due to an increase in penicillin resistance of the oral lactobacilli in the group using the penicillin dentifrice, the results of the plate counts on the penicillin containing tomato-juice agar were compared for the two schools. None of the plates containing 10 units or more of penicillin per milliliter of agar permitted any lactobacilli to grow, indicating that if any highly resistant strains were present the number must have been extremely low. The number of samples which showed one or more lactobacillus colonies on the plates containing 1.0 unit of penicillin per milliliter of agar is given in Table 1. This table lists the results of the counts on penicillin agar (1.0 unit/ml.) for both the June and December experiments. It is immediately apparent that only a small percentage of the salivas contained any

**Table 1** • Incidence of penicillin-fast lactobacilli in saliva samples of school children, June–December 1949.

| | Control school | Penicillin school |
|---|---|---|
| Number of samples.... | 129 | 181 |
| Resistant to 1.0 unit/ml.* | | |
| Counts of June..... | 19 (14.7%) | 40 (22.1%) |
| Counts of December. | 31 (24.0%) | 50 (27.6%) |
| June and December†. | 14 (10.8%) | 26 (14.4%) |
| Increased positives, December..... | 17 (13.2%) | 24 (13.3%) |
| June positives, negative in December.... | 5 ( 3.9%) | 14 ( 7.7%) |

* Plates showing growth of one or more lactobacilli on pH 5.0 tomato-juice agar containing 1.0 unit sodium penicillin G per ml. agar.

† Samples which were positive both in June and December for penicillin-resistant lactobacilli.

lactobacilli which could grow out in the presence of 1.0 unit of penicillin per milliliter. This is true for the experimental school using the penicillin dentifrice as well as for the control school which used the same dentifrice from which penicillin had been omitted. It is also apparent that the appearance of penicillin-fast lactobacilli in either school is subject to considerable fluctuation. For example, although only 10.8 per cent of the control samples and 14.4 per cent of the experimental samples were positive for both counting periods, the percentage increase in positive penicillin-fast plates from June to December was the same for each group.

When the data are subjected to statistical analysis (Table 2) two conclusions emerge: first, that the differences between the two groups are not of a magnitude that can be considered significant; and secondly, that the appearance of penicillin-fast organisms in these experiments is a chance phenomenon unrelated to the dentifrice used.

## DISCUSSION

On the basis of Hill's[1] study it would be expected that one of the effects of using the penicillin dentifrice would be a reduction in salivary lactobacillus counts. In the present study this expectation was not realized. One explanation for this would be the development of penicillin-fastness by the lactobacilli in the case of the children using the penicillin dentifrice.

If such were actually the case, it should become readily apparent if the salivas were plated on media containing penicillin. This was done at three different penicillin levels: 1.0, 10.0 and 50.0 units of penicillin per milliliter of agar. The lowest level used was the one shown in preliminary titrations to prevent the growth of all but an occasional lactobacillus colony on tomato-juice agar. Consequently organisms which grew at this concentration of penicillin cannot be considered definitely penicillin-fast, but possibly only as naturally occurring less sensitive members of the population. However, in the event that we were actually encountering penicillin-fastness in the experimental school, the fact should be manifested in two ways: (1) a greater number of colonies developing on the 1.0 unit plates in the experimental school; and (2) a greater number of positive 1.0 unit plates in the experimental school. It would also be expected that some of the 10.0 and 50.0 unit plates would be positive if a significant degree of penicillin resistance had been developed.

**Table 2** • Incidence of penicillin-fast lactobacilli in school children. Statistical treatment of data.

| | Pen.-fast% | S.E.% | S.E.D.% | D.% | D.%* / S.E.D.% |
|---|---|---|---|---|---|
| June | | | | | |
| Control... | 14.7 | 3.1 | 4.4 | 7.4 | 1.68 |
| Expt'l..... | 22.1 | 3.0 | | | |
| December | | | | | |
| Control... | 24.0 | 3.8 | 5.0 | 3.6 | 0.72 |
| Expt'l..... | 27.6 | 3.3 | | | |
| June & Dec. | | | | | |
| Control... | 10.8 | 2.7 | 3.8 | 3.6 | 0.94 |
| Expt'l..... | 14.4 | 2.6 | | | |

* To be considered as highly significant $\frac{D.}{S.E.D.}$ should have a value of 3.0 or greater.

The fact that none of these expectations was realized experimentally indicates that, under the conditions already described by Zander,[2] the use of the penicillin dentifrice did not result in a permanent decrease in salivary lactobacillus counts, nor did it result in an increased incidence of penicillin-fast lactobacilli compared with a control group using the same dentifrice except for the omission of penicillin.

SUMMARY

1. Salivary lactobacillus counts of children using a penicillin dentifrice for a year and a half and a control group using the same dentifrice without penicillin showed no significant differences.

2. The incidence of penicillin-fast lactobacilli was not significantly greater in the group using the penicillin dentifrice.

*Research* • Research, although at first sight so different from invention, consists largely of the design and perfection of apparatus for observation and measurement. A few months ago I met Professor Hertwig who was the first to observe the actual process of fertilization by the fusion of the nuclei of an egg and a spermatozoon. About a third of modern biology is based on this simple fact which every educated person today takes for granted. My wife asked me whether I thought there were many discoveries at once as simple and as important to be made in the realm of biology by mere observation. Personally I do think so, but they will depend on the invention of new means of observation as powerful and ingenious as the microscope, which had undergone two hundred years of development when Hertwig made the great discovery. *J. B. S. Haldane, "Science and Human Life." New York: Harper and Brothers, 1933, p. 195.*

*Qualities of the Investigator* • In listing the traits which have seemed to me important for a career of investigation—curiosity, imaginative insight, critical judgment, thorough honesty, a retentive memory, patience, good health, generosity, and the rest—I have not attempted to weigh their relative values. Anyhow, that would be difficult. A beginner, who seriously plans a life of productive scholarship, should not be disheartened if he thinks his qualifications do not meet requirements. Training and practice may not lead to perfection, but they will surely compensate for early inadequacy. *W. B. Cannon, The Way of an Investigator. New York: W. W. Norton & Co., Inc., 1945, p. 31.*

# Full denture construction from the obtaining of the centric maxillomandibular record to completion of the dentures

*Clyde H. Schuyler, D.D.S., New York*

A prosthetist constructing a full denture is rendering a health service to his patient equal in importance to the services rendered by any other specialist in the field of dentistry or medicine. As the success of the denture involves a high degree of craftsmanship, it has been too often thought of as a craft rather than a health service.

In the lives of many, the artificial denture is a necessity. Without it, they would be unable to properly masticate, digest and assimilate foods essential to maintain health. It is an essential for the maintenance of self respect, social position and employability.

The work of the dental prosthetist requires a knowledge of histology, anatomy, physiology and other basic sciences. The artificial denture must function as part of a living organism. The denture made with a disregard of these factors, or one used after tissue changes contraindicate its continued use, may not only fail in restoring function and esthetics, but may cause oral irritation, rapid resorption or destruction of supporting tissues and malignant degeneration. Ill-fitting dentures may be the contributing factor in temporomandibular joint disturbances, tinnitus, vertigo, defective hearing, headache and facial neuralgia. Probably the most common ill effect of an ill-fitting denture, and one too seldom given consideration by either the dentist or the physician, is the effect of continued oral discomfort upon the nervous system and, indirectly, upon general organic function. Edwin P. Seaver,[1] said, "malocclusion consciousness removes another symptom complex from the waste basket of neurosis." Malocclusion is only one of many factors in denture prosthetics which may contribute to neurosis. Many patients being treated for neurosis, gastrointestinal or other organic disturbances, cannot be restored to health until they receive a compatible denture service.

The elimination of oral foci of infection as a health hazard has placed added responsibilities upon the dentist. The rendering of a denture service to meet the biomechanical needs of the patient is of equal health importance. The possibility of this service being rendered by the dental laboratory technician who is untrained in the biological sciences has been mentioned. No one seriously interested in public welfare, who is familiar with the biomechanical aspects of denture service and their relation to health, could make such a suggestion. In the interest of public health, the dentist who is responsible for the rendering of this important health service must be given progressively better training in all basic sciences.

Of all sciences in the practice of dentistry, perhaps that of greatest importance is the science of articulating teeth. It involves every phase of corrective or restorative dentistry. The correlation of

Presented at the eighty-ninth annual session of the American Dental Association, Chicago, September 15, 1948.

1. Seaver, Edwin P., Jr., Temporomandibular joint malocclusion and the inner ear; a neuromuscular explanation. Read before the Eastern Section Meeting of the American Laryngological, Rhinological and Otological Society, Boston, January 7, 1937.

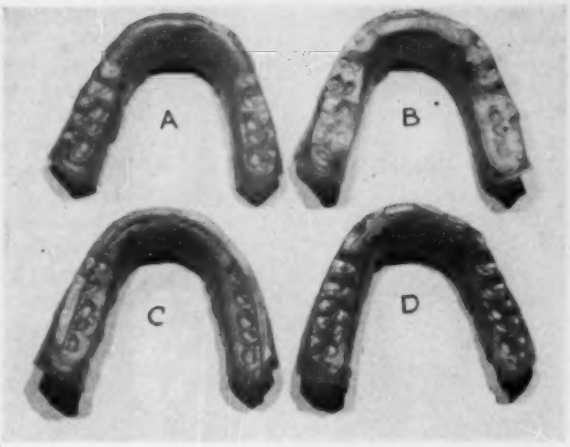



*Fig. 1 • Two thicknesses of baseplate wax have been warmed and adapted over the occlusal surfaces of the lower denture for the purpose of obtaining intraoral records. The wax must be flamed to an even depth. A shows the result of the first attempt. Cusps are penetrating to the greatest depth in the molar region. The wax is cut away and leveled, as in B. Thickness permitting, it may again be flamed evenly and the second record obtained. In C, when too close proximity of the cusps exists, the addition of a narrow strip of wax is necessary. D shows the desired record with even cusp penetration, no opposing cusps contacting*

teeth has been generally accepted as the most important phase of full denture prosthetics. This is not meant to minimize the importance of other factors. It involves the obtaining of an accurate maxillomandibular relation record and the arrangement of teeth and tooth inclines in a manner to give the maximum of function with the minimum of stress or trauma to the supporting tissues.

A careful study of the compatible relation of teeth in function, the muscles of mastication, the temporomandibular articulation and associated structures, will demand respect for the complexity of the masticatory organism. The mechanism is three dimensional, not something functioning upon a plane or from one center of movement.

Centric maxillomandibular relation has been defined as "The relation existing between the mandible and maxilla when the condyle heads are in the most retruded relation in the glenoid fossae from which lateral movements can be made." The centric maxillomandibular relation record must be made with an equal distribution of stress over the entire denture bearing area. Unilateral or premature occlusal contacts will be tolerated no more readily than a protrusive or lateral relation between maxillary and mandibular dentures.

The accuracy of the central bearing point and the gothic arch tracing is most often expounded. I am familiar with this technic and have advocated its use in student teaching of dental prosthetics. It has, however, its weaknesses. To obtain an even distribution of occlusal stress, the bearing point must be in the center of both upper and lower arches. In cases of mandibular prognathism or retrusion, it is impossible to place the bearing point in the center of each arch; therefore, uneven distribution of occlusal stress and inaccuracies are inevitable. I have used wax intraorally to obtain maxillomandibular relation records and to check the mountings of casts for accuracy. For many years, in teaching dental prosthetics to the undergraduate student, the intraoral wax check record was used to check the mounting of casts upon an articulator, the original maxillomandibular relation record having been obtained by the central bearing point.[2]

2. Schuyler, Clyde H., Intra-oral method of establishing maxillomandibular relation. J.A.D.A. 19:1012 (June) 1932.

The theory motivating additional check records to prove accuracy of cast mountings is that only an accurate unstrained maxillomandibular relation can be exactly duplicated. A protrusive or a lateral relation record, or a movement of the denture base while the record is being obtained, cannot be exactly duplicated. In the construction of complete maxillary and mandibular dentures, a preliminary relation record may be obtained with wax or compound occlusal rims, or in any acceptable manner. A face-bow is used to properly relate the casts upon the articulating instrument, after which teeth are related and tried in the mouth for vertical dimension. The mounting of the casts on the articulator is then checked to verify the accuracy of the preliminary centric relation record. This is accomplished by placing one or two thicknesses of common baseplate wax over the occlusal surface of the lower teeth. The wax is carefully warmed to an even depth. The upper teeth being in the mouth, the lower denture is inserted into the mouth and the patient requested to close gently into the wax. (The request is always made that the patient close upon the back teeth to induce them to close in the normal retruded relation.) No opposing tooth cusps should be permitted to make contact through the wax, as such tooth contacts would induce uneven occlusal stresses or movement of the denture base.

An even penetration of the cusps into the wax is necessary to assure an even distribution of occlusal force. This is seldom obtained in the first trial. By trimming the wax (and in some instances adding an extra thickness) and rewarming the entire surface and reinserting, an even penetration of opposing teeth into the wax is obtained. (Figs. 1 and 2). Cusp penetration of approximately 1 mm. is most desirable. The thickness of wax separating the teeth should not exceed 1 or 2 mm. The check record is thoroughly chilled and returned to the articulating instrument. Accuracy of mounting is proved only when, upon closing the instrument in centric, every tooth cusp fits perfectly into the opposing wax record (Fig. 3). If the first check record shows evidence of error, a second wax record should be obtained from the patient. If a similar inaccuracy is noted, one of the casts should be remounted. This mounting, before being accepted as correct, must again be checked and proved by obtaining an additional record from the

*Fig. 2 • Records showing uneven cusp penetration or contact of opposing tooth surfaces are not acceptable, as they would indicate uneven tissue compression and probably movement of the denture upon the supporting tissue*

patient. Records which can be duplicated are evidence of accuracy, as only accurate records can be duplicated. The value of this procedure in checking the mounting of casts upon an articulating instrument has been confirmed not only in my practice over a period of 20 years, but in checking several thousand cases each year at the New York University School of Dentistry. Accurately fitting base trays are essential in obtaining accurate centric relation records, regardless of the procedure.

Harmony between centric maxillomandibular relation and occlusion of teeth cannot be determined by asking the patient to close and observing tooth relation in the mouth. When gross inaccuracies exist, they may be noted; but what appears to be an acceptable relation may prove to be grossly inaccurate when the dentures are placed upon noncompressible casts and mounted on a rigid instrument. Intraoral visual checks of occlusion are deceptive as tissue compression, movement of denture base upon the tissue, or change in maxillomandibular relation, or all of them, may occur as the opposing teeth are brought into contact without being detected by the eye. I feel that my vision and ability to observe these changes are equal to the average dentist. Years of practice, however, have proved unquestionably my complete inability to visually detect occlusal disharmonies of complete artificial dentures while they are in the mouth. Anyone relying upon this procedure of checking occlusion, or endeavoring to correct occlusal disharmonies of full dentures in the mouth, is subject to gross error.

Unfortunately, the problem of completing artificial dentures with harmony of occlusion in centric relation does not end with the obtaining of accurate records for the mounting of casts. I know of no means of processing dentures without disturbing the occlusal harmony. The use of injector processing flasks will reduce

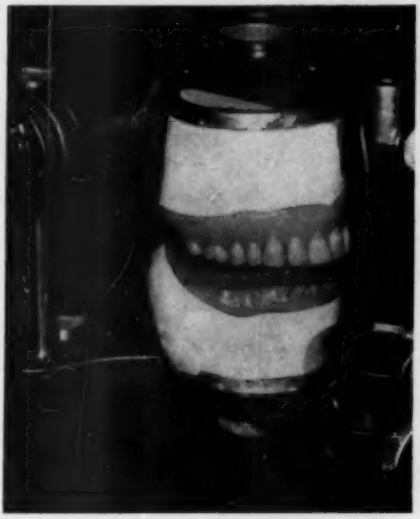


*Fig. 3 • The chilled wax record is trimmed with a sharp knife exposing the depth of buccal cusp penetration to facilitate vision. As the instrument is closed in centric relation, each upper cusp must drop accurately into position. Only an accurate unstrained centric relation record can be exactly duplicated, and such a check can be accepted as positive evidence that casts are accurately related upon the instrument*

changes greatly, but only one blind to facts or one who has not made accurate tests will proclaim his ability to process dentures without creating occlusal disharmonies.

Dentures should be returned to an articulating instrument after processing for the correction of occlusal disharmonies and the reduction of cusp inclines, the steepness of which might cause an undesirable degree of horizontal stress to be placed upon the supporting tissue. To avoid the loss of original records and mountings and to eliminate unnecessary chair time, casts can be grooved preparatory to mounting upon the articulating instrument in a manner to permit their removal from the instrument for the flasking and processing of the denture

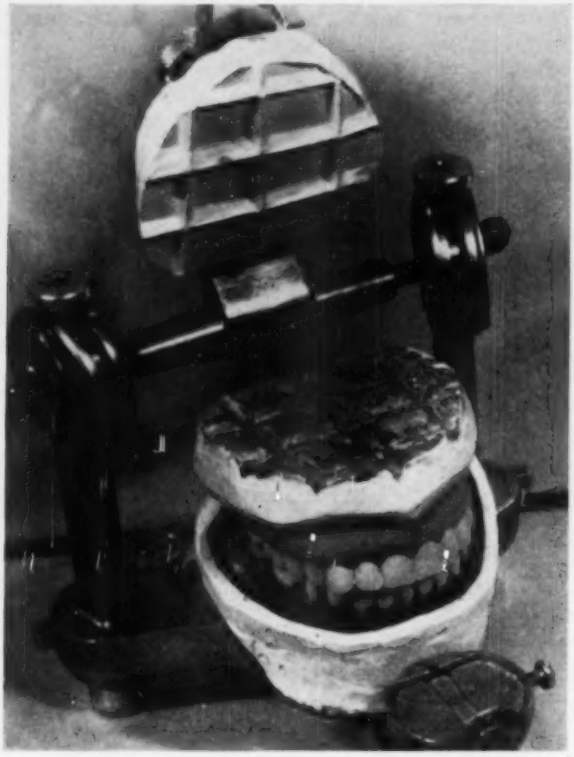


*Fig. 4 • Showing the grooving of a cast preparatory to mounting. When treated with a separating medium, it is readily removed from the articulator for the processing of the dentures. The covering of the base of the cast with well-adapted tinfoil before flasking will facilitate its removal from the flask and accurate repositioning. The cast and the processed dentures are accurately replaced upon the instrument for the correction of occlusion and reduction of cusp inclines*

and their subsequent return to the instrument without change of position. The cast and the processed denture are returned to the articulating instrument before the denture is removed from the cast, thus enabling the dentist or laboratory technician to correct occlusal disharmonies both centric and eccentric (Fig. 4). When constructing both upper and lower dentures, it is most desirable to process one denture, return it to the articulating instrument and reposition the opposing teeth to compensate for the processing changes which have occurred, before processing the second denture. In this manner, the corrective grinding of tooth surfaces to eliminate occlusal disharmony is minimized.

The photographs shown in Figures 5, 6, 7, 8 and 9 were the result of a discussion with an old experienced dental laboratory technician who was positive that he could process acrylic base dentures using a common flask without inducing a change in occlusion and was willing to try the experiment to prove his ability. The tests were made at a Navy base and the results were published in 1944.[3] Dentures made with cuspless teeth will show less evidence of change than those made with natural form teeth, cusp teeth accentuating the change.

The final correction of occlusal disharmonies in both centric and eccentric

3. Schuyler, Clyde H.; Friedrich, E. G., and Vaughan, H. C., Jr., Processing acrylic dentures; compression and injection method. U. S. Nav. M. Bull. 43:297 (Aug.) 1944.

positions must be accomplished by selective spot grinding.[4] The objectives which should be realized in the correction of occlusal disharmony are:

1. The maximum distribution of stress in centric maxillomandibular relation.
2. The retention of the maxillomandibular opening.
3. The harmony of guiding inclines, thereby distributing eccentric occlusal stresses.
4. The reduction of the incline of guiding tooth surfaces, that occlusal stresses may be more favorably applied to the supporting tissues.
5. The retention of sharpness of cutting cusps.
6. The increase of food exits.
7. The decrease of contact surfaces.

The goal must be the reduction of essential forces which will be applied in the act of mastication and the distribution of such forces in a manner favorable to the supporting tissues.

Harmony of occlusion must be first established in the centric maxillomandibular relation. In normal relation, the upper lingual cusps occlude in the central groove of the opposing lower teeth, and the lower buccal cusps occlude in the central groove of the opposing upper teeth. These cusps (the upper lingual and lower buccal) are, figuratively speaking, the cutting blades in function. Their sharpness is important, and by their retention maxillomandibular height is retained. By including them in corrective eccentric grinding, both sharpness in function and maxillomandibular height are lost. Disharmony in eccentric occlusal relations is not due to the prominence of these cusps, but is due to the incline of the plane upon which these cusps function in the eccentric excursions; that is, the buccal plane of the upper teeth and the lingual plane of the lower teeth. Therefore, all grinding in eccentric relations should be done upon the buccal incline of the upper teeth and the lingual incline of the lower teeth.

A steep vertical overbite of anterior teeth is contraindicated in full artificial dentures. As a routine procedure, I construct all full dentures with little or no vertical overbite, which enables me to materially reduce all guiding inclines of posterior teeth, thereby reducing lateral stresses and tissue trauma.

*Fig. 5 • Dentures are waxed preparatory to processing. The casts have been grooved in a manner to permit their removal from the instrument for the processing of the dentures and the subsequent return of the casts and the dentures to the instrument without loss of the centric relationship*

*Fig. 6 • The upper denture has been processed. Occlusal imbalance is evident*

4. Schuyler, Clyde H., Fundamental principles in the correction of occlusal disharmony, natural and artificial. J.A.D.A. 22:1193 (July) 1935.

*Fig. 7 • The lower denture has been processed. The extreme occlusal disharmony introduced during the processing of the two dentures is evident. The dentures were processed in the usual manner. Incisal guide pin was opened several millimeters*

Occlusion cannot be satisfactorily equilibrated by the use of abrasive pastes. In an endeavor to correct occlusion, the seven objectives outlined could not be realized by the use of pastes alone. In fact, every one of the seven objectives would be lost.

Following the selective spot grinding with small abrasive stones, a very fine paste may be used to smooth or polish the ground surfaces. A dozen excursions from eccentric to centric should be sufficient to accomplish this purpose.

Double-faced typewriter carbon paper is more serviceable in determining areas of premature contact in artificial dentures than the commonly used books of dental tracing paper. It is thinner and its markings more definite. The markings of thick tracing paper may be very deceptive. In the final checks, very thin paper or cellophane drawn from between the occluded teeth in both centric and eccentric positions may show surprising discrepancies of occlusal contact.

*Fig. 9 • Following processing of both dentures in the injector flask. Bite has been opened 1 mm. measured as previously stated. While the change in occlusion is greatly reduced by the use of the injector flask, the elimination of changes creating occlusal disbalance seems to be impossible. The necessity of remounting finished dentures for the correction of occlusal disharmony should be evident*

*Fig. 8 • The second experimental case was prepared. The lower denture was processed by the injector flask method. Some disturbance of cuspal relationship was evident. Bite opening was 0.5 mm. as measured by drop of the incisal guide pin*

Unfortunately, most artificial anterior teeth are too thin labiolingually. When a full upper artificial denture is made opposing a full lower artificial denture, contact of the anterior teeth may not be essential for the maximum distribution of functional forces to the supporting structures; but when, as is common, a full upper denture is made opposing a partial lower denture, the lower natural anterior teeth remaining, it may be most desirable to have contact of the anterior teeth in

*Fig. 10 • The labiolingual thickness of anterior teeth essential to satisfy esthetic demands and maintain centric relation contact with lower natural teeth is obtained by building lingual contour with acrylic of comparative tooth shade*

the centric relation. This would give the maximum distribution of stresses and occlusal balance in centric and eccentric positions, and may be an important factor in preventing trauma and destruction of saddle areas and abutment teeth supporting the lower partial denture and in enabling the patient to incise without an excessive anterior movement. It may be readily accomplished by building the desired lingual contour to the upper anterior teeth with a comparative shade of acrylic (Fig. 10).

The normal settling of dentures incidental to tissue adaptation or progressive tissue changes may contribute to the loss of occlusal balance. A new centric relation record should be obtained and occlusal relations checked within a few days following the insertion of dentures and periodically thereafter.

There must be an even distribution of occlusal stresses, a static relation of the occluding teeth as tooth contact is made with the condyle heads at rest in the glenoid fossae. In the eccentric, there must be not only balancing contacts, but complete smoothness in function as occluding teeth glide from the eccentric to the centric relationship. Everybody is familiar with the comfort of riding in an automobile driven over a smooth cement highway as compared to the discomfort of riding over a rough road with bumps and holes. With denture wearers, interfering cusps, bumps and ripples on occluding tooth surfaces produce denture instability resulting in tissue irritation, wear and tear upon the general nervous system and other complicating sequelae.

Tissue health depends also upon cleanliness. Many patients who thoroughly clean their dentures do not brush or clean the mucosa covered by the denture. Vigorous brushing with a dental paste removes food particles, stagnant mucous and dead mucosa cells, and stimulates circulation.

Denture patients deserve conscientious and painstaking efforts. The replacing of lost teeth by artificial substitutes is not a simple mechanical service, but a most important health service which may have far-reaching effects upon the general health and welfare of the patient.

*400 Madison Avenue*

# *Cases and Comments*

## SUBMAXILLARY PHLEGMON OF DENTAL ORIGIN TREATED WITH AUREOMYCIN

*By Chas. L. Toole, Jr., D.D.S., Chief, Dental Service, Veterans Administration Hospital, Coral Gables, Fla.*

Infection from the mandibular teeth, particularly the third molar and supporting structures, causes a periostitis with extraperiosteal cellulitis and submaxillary phlegmon by direct extension into the soft tissues from the periosteum.

Phlegmons of the floor of the mouth and the submaxillary region are of a serious character, producing diffuse cellulitis without tendency to suppuration or localization.

Although it is true that some surgical procedure, such as the removal of a mandibular third molar, precedes the extension of infection into the submaxillary region, it is also known that such extension may occur when no surgery has been done.

Two cases are presented in which there was an extension of an infective process to the submaxillary niche, the parapharyngeal space and downward along the neck; in one patient a mandibular third molar had been removed, and in the other no extractions were done. Both patients responded to treatment with aureomycin.

### CASE NO. 1

On September 15, 1949, a 30 year old man was admitted to the Veterans Administration Hospital, Coral Gables, Florida. He complained of difficulty in swallowing, speaking and breathing. He was in acute pain and there was marked swelling of the left side of the face and submaxillary area. The third molar tooth had been removed under procaine (Novocain) anesthesia. Four days previous to admission the patient first noticed difficulty in swallowing. On September 14 he had a chill and was given 300,000 units of penicillin intramuscularly. On September 15 the patient had a second chill and was again given 300,000 units of penicillin intramuscularly.

*Examination* • This 30 year old man of robust stature was in acute pain. There was present submaxillary phlegmon on the left side with propagation into the sublingual space. The edema extended to the submaxillary niche, the peripharyngeal space and downward along the neck. There was trismus and the patient had difficulty in opening his mouth; however, in spite of this, the mouth had a tendency to hang slightly open and the tongue was elevated. The temperature at time of admission was 100° F.

Laboratory Studies Revealed: WBC 9,500. Neutrophils 74 per cent; lymphocytes 25 per cent; monocytes 1 per cent. Urine negative. Serology negative.

*Treatment* • On September 15, 500 mg. of aureomycin was administered intravenously; on September 16, no aureomycin was administered because of temporary lack of supply; September 17 through September 21, 300 mg. intravenously plus 500 mg. orally every six hours, making a total dosage of 12 Gm. On September 23 the patient was found to be free of symptoms and was discharged.

### CASE NO. 2

On September 30, 1949 a 43 year old man was admitted to the Veterans Administration Hospital, Coral Gables, Florida. He complained of difficulty in swallowing, was in acute pain and could open his mouth only to the extent of about 1 cm. There was marked swelling on the left side of the face with regional cervical adenitis.

There was no history of previous swelling; however, this patient had suffered severe toothache over a period of 18 months, at times lasting from three to five hours. Swelling was first noticed two days before admission. On the morning of September 30 before admission, 300,000 units of penicillin was administered intramuscularly.

*Examination* • This 43 year old man, apparently in good health although he showed signs of recent loss of weight, was in acute pain. Submaxillary phlegmon was present on the left side. The edema extended downward along the neck. Considerable trismus was present. Temperature at the time of admission was 102° F.

*Treatment* • On September 30, 300 mg. of aureomycin was administered intravenously, and from October 1 to 6, 500 mg. of aureomycin orally every six hours, making a total dosage of 10.3 Gm. On October 2, the lower left third molar was removed under local an-

esthetic. On October 6 the patient was free of symptoms and was discharged.

COMMENTS

Both patients had received penicillin before entering the hospital and both presented practically identical problems and showed rapid recovery after aureomycin therapy. It is obvious that both patients had a tendency to overestimate their symptomatic improvement. However, it seemed odd that both patients offered the information that, shortly after intravenous aureomycin was started they were able to open their mouths to a greater degree and there was less pain.

CONCLUSION

No definite conclusion can be drawn from two cases. However, in view of the immediate subjective improvement which was correlated with clinical findings, and in view of the now recognized potency of aureomycin as an antiinfectious factor, it is suggested that the antibiotic had beneficial effect in the two infections described. The reaction to aureomycin seemed to be more dramatic than that seen in similar cases treated with penicillin. Additional studies are being made regarding the therapeutic potentialities of aureomycin in dental infections of all types.

Sponsored by the Veterans Administration and published with the approval of the Chief, Medical Director. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

## PROSTHETIC RESTORATION OF SOFT PALATE LOST AS A RESULT OF DIPHTHERIA: REPORT OF A CASE

*By Louis Emory, D.D.S., Kenton, Ohio (Major, Dental Corps, Prosthetic Section, 285th Medical General Dispensary, Tokyo, Japan).*

A 34 year old veteran, survivor of the Bataan Death March, was admitted to the Wm. Beaumont General Hospital for plastic surgery to reconstruct a portion of the soft palate. Of the large number of acquired palatal defects which we were called upon to treat, this case was unusual in that it was not a gunshot wound and that it was confined to the soft palate. Most palatal defects were in the bony anterior portion of the palate.

The case history was brief and stated that the patient vaguely remembered that he had been seriously ill for a period while a prisoner of the Japanese. He had been examined by several Japanese medical attendants and at one visit they had removed a large mass of necrotic tissue from his throat by means of a tongue depressor. It was later established that the patient had contracted diphtheria.

Our examination found approximately two-thirds of the soft palate missing. The uvula was absent and the tissue adjacent to the defect gave the typical appearance of cicatricial bands of fibrous tissue running downward to the pillars of the fauces. No curtain-like velum existed to close off the oropharynx from the nasopharynx as the remaining tissue was tough, inelastic, fibrous bands with inadequate blood supply for successful surgery.

The patient did not realize that his speech was so affected that he could not be understood and was impatient and disturbed by anyone who asked him to repeat his words. His chief complaint was his inability to control liquids and saliva between the oral and nasal passages and for this reason he insisted upon surgical correction. He had refused to cooperate whenever prosthetic appliances had been attempted. His gagging and obvious discomfort convinced all who had tried to take impressions that prosthetic appliances would be failures.

He was admitted to the psychiatric section for consultation and it was suggested to attempt surgery to eliminate any doubt in the patient's mind. The surgical attempt resulted in a greater loss of tissue and the patient was referred to the dental section for prosthesis. The patient was depressed and reluctant to cooperate but was reassured that cases had been seen in which the patients had suffered greater loss of tissue and, nevertheless, were able to wear appliances. He agreed to cooperate but was extremely apprehensive.

A perforated tray was extended by means of compound towards the defect and an alginate impression was taken. A thicker mix than that recommended by the manufacturer was used and the retarder was sparingly used so as to produce a rapid-setting mix. The resulting model contained all of the hard palate and most of the defect area (Fig. 1).

A full palatal section of shellac baseplate was very carefully adapted to this model and reinforced at the junction of the hard and soft palates. A loop of wire was then attached to the palatal section to facilitate insertion and removal of the section and to prevent any accident. Compound was added to comform to the defect area and inserted for a preliminary impression. Green compound was then used to obtain the desired shape of the obturator (Fig. 2). The sides of the impressions were shaped by the tissues on either side of the defect. This was readily accomplished, for the patient had violent contractions upon each

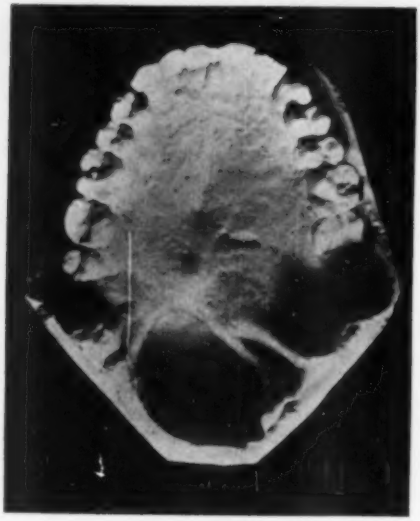


*Fig. 1 • Original model showing portion of defect*

*Fig. 2 • Palatal section of shellac baseplate with compound impression of defect*

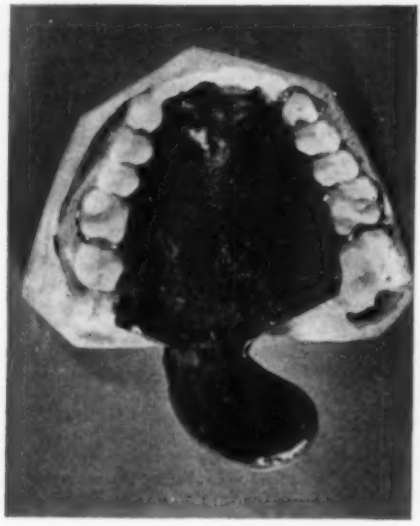


*Fig. 3 • Final assembly ready for investing*

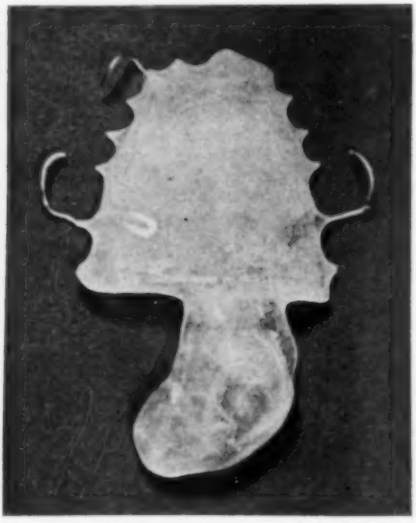


*Fig. 4 • Completed obturator*

insertion of the impression. The posterior border was carried to the posterior wall of the pharynx to the prominence formed by the body of the atlas.

The clasps were contoured and assembled to the baseplate section on the original model which had been trimmed of the defect area (Fig. 3).

The acrylic obturator (Fig. 4) was trimmed so as to be concave on the underside and the obturator portion was continuous with the palatal portion. The obturator was not made hollow and resulting thickness was desirable for strength.

Upon insertion of the finished obturator, there was discomfort for several hours and slight trimming of the posterior border was necessary to eliminate a sore spot. The speech improvement was dramatic in that speech was restored immediately to normal with a faint evidence of nasal quality in the tone.

*666 North Wayne Street*

## A CASE REPORT OF A PARADENTAL CYST

*By Ralph Raymond Mezrow, D.D.S., Assistant Visiting Oral Surgeon, Sydenham Hospital, New York.*

Edward Stafne, of the Mayo Clinc, classifies cysts derived from odontogenic tissue as periodental cysts, which he claims are synonymous with dental root cyst, root end cyst, radicular cyst, paradental cyst and dentoperiosteal cysts, because of their derivation from the remnants of the periodental membrane (epithelial rests of Malassez).

According to Kronfeld, cysts form either from abscessed cavities in granulation tissue at root ends containing epithelial tissue, because of the desire of epithelial tissue to cover raw surfaces, or from epithelial masses which have proliferated because of inflammatory disturbance, and which have subsequently undergone cystic degeneration. The case in question is a paradental cyst, so classified by virtue of location.

The patient, a Negro woman, married, age 51 years, came to the clinic on April 28, 1948, complaining of vague discomfort in the right mandibular bicuspid area. This disturbance had been noted for a period of three months prior to her first visit.

Intraoral examination proved negative, with no areas of swelling or tenderness. The mucous membranes and anatomical constituents of the oral cavity were normal in color and character. Extraoral examination likewise proved negative.

Roentgenographic examination revealed an area of abnormality distal to the lower right second bicuspid. A uniformly thick, dense, concentric radiopaque area, with a more radiolucent center containing fine opaque striations, was observed distal to the alveolus of the lower right second bicuspid, and approximately 3 mm. beneath the crest of the alveolar ridge, midway between the buccal and the lingual cortical plates.

The past family history was essentially free from disease. Serology was negative. Urinalysis showed nothing abnormal. Pulp test findings of the teeth were normal.

Upon completion of the examination, and in view of the subjective complaint of pain, the following operation was performed by a member of the oral surgery staff, Temple University, School of Dentistry.

Under mandibular block anesthesia, an incision was made on the crest of the ridge through the periosteum to sound bone, distal to the second bicuspid for approximately 5 mm. A second incision was made from a point on the ridge, distal to the first bicuspid on an anterior 45 degree angle toward the mucobuccal fold. A mucoperiosteal flap was elevated and retracted (Fig. 1). The osseous structure was of normal appearance. A mallet and bone chisel had to be used to cut through the cortical bone in order to reach the area observed roentgenographically (Fig. 4). Subsequently a mass more solid than the surrounding bone structure was reached, which in turn was enucleated *in toto* (Fig. 2). The mucoperiosteal flap was returned to position and sutured (Fig. 3). Since so little trauma attended the operation, no dressing or sulfonamide powder was deemed necessary by the author.

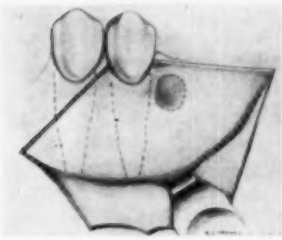


*Fig. 1*

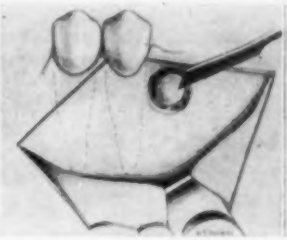


*Fig. 2*

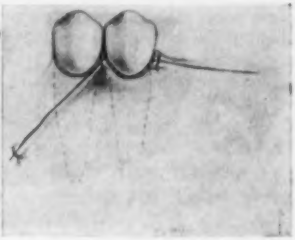


*Fig. 3*

*Fig. 4*

A report by the Pathology Department of Temple University School of Dentistry on the tissue removed read as follows:

"The specimen is a round, hard, almost white mass, measuring 5 mm. by 4 mm. by 3 mm., to which are adherent some bone spicules. The inner aspect is soft and darker in color. Microscopic examination reveals a compact bony structure arranged in concentric layers, surrounding a loose connective tissue which is lined by multilayered squamous epithelium (3-8 layers) forming a cavity.

"From its location a paradental cyst is to be considered."

The patient had an uneventful recovery and claimed the loss of the original discomfort.

In view of the size of the cyst, and the apparent nondisplacement of tissue, it is to be questioned whether the cure was affected psychologically or by surgery. The lamellated appearance of the concentric lines of bone observed roentgenographically and histologically, suggests a reduction in size of a larger cystic lesion due to intermittent periods of drainage. The patient, however, gave no history of this fact.

*6 Old Lancaster Road, Merion, Pa.*

## BENEFITS FROM PROPHYLACTIC USE OF PENICILLIN BEFORE DENTAL EXTRACTIONS

*Discussion following address by Paul D. White, M.D., at medical-dental institute held by Rhode Island State Dental Society at Brown University. By Frank B. Cutts, M.D., Cardiologist, Rhode Island Hospital.*

During the past ten years at the Rhode Island Hospital, 45 cases of subacute bacterial endocarditis, proved by several positive blood cultures or at autopsy, have been seen. During the first five years, the records were inadequate to indicate the relationship between this disease and previous dental extraction. In the second five years, however, 25 cases were encountered and in eight of these there had been dental extractions a short time before the onset of the illness. In 15 patients, no comment was available in the record concerning the relationship between dental work and this disease, so that the percentage may have been considerably higher. No instance was encountered in which subacute bacterial endocarditis followed dental extraction associated with the prophylactic use of penicillin. Evidence from the literature was cited to indicate that the incidence of positive blood cultures after dental extraction is reduced considerably following the use of penicillin, but not completely eliminated. However, several patients with damaged hearts who were so treated did not develop bacterial endocarditis. This would suggest that, although positive blood cultures may occasionally be encountered, the organisms die too rapidly to become implanted on damaged areas in the heart.

Therefore, the intelligent use of penicillin prior to dental extraction in patients with valvular or congenital heart disease should significantly reduce the incidence of subacute bacterial endocarditis.

*154 Waterman St., Providence 6, R.I.*

JULY 1950

LON W. MORREY, D.D.S., EDITOR

VOLUME 41 • NUMBER 1

Published by the American Dental Association
222 East Superior Street • Chicago 11, Illinois

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

## *Editorials*

# House of Delegates to consider raise in dues at 91st annual session

One of the major problems that will face the House of Delegates at the 91st annual session next fall is how to maintain the Association on firm financial footing without curtailing its activities or jeopardizing the expansion of services in the future. A satisfactory solution to this problem, which involves both budgets and dues, can be arrived at only if the membership has an understanding of the Association's financial status and the effect which a decade of inflation has had on it.

The Association entered the period of World War II in an exceptionally sound financial condition. In 1941 its net assets were $772,563.93. However, like every other organization, indeed like every individual, the Association was soon subject to wartime spiraling prices. Despite this fact it emerged from World War II in 1946 with a net worth of $1,193,770. Between 1946 and 1949 operational costs continued to rise and services of the Association continued to increase; on the other hand dues remained constant at $6.00 per year. In order to offset the difference between income and expenses during that three year period, the House of Delegates was forced to withdraw $270,504 from reserves, reducing the Association's assets to $923,266. Stated in terms of net worth per member the figure stood at $17.75 in 1946 compared to $14.03 at the end of 1949.

The House of Delegates stopped this drain in 1948 by raising the annual dues as of January 1, 1949, from six to twelve dollars. However, the raise in dues barely compensated for the rise in prices and the cost of expanded services. It did not provide for further expansion of activities and it neither provided a surplus with which to rebuild the Association's resources to their former figure nor increased them to a point where they could safeguard present activities.

The Association should maintain a reserve fund equal to its annual budget so that in the event of some major emergency it could operate for a year without income. The 1950 budget of the Association amounts to $1,420,979. Its restricted reserve fund, established by the Board of Trustees last February for use only in cases of emergency, amounts to only $200,000. This fund should be increased to $1,500,000, an amount approximating the current annual expenditures, if the Association is to buttress itself against any drain in the future.

Because of its excellent financial position the Association was able to weather the inflationary storm of the 'forties, but it did so at the expense of a substantial portion of its liquid assets. It is sound business, therefore, not only to rebuild those assets quickly but to increase them sufficiently to compensate for present inflationary conditions.

Assuming that the present program and the present dues of the Association remain static, it will be impossible to build the Restricted Reserve Fund to the proper limit of safety. Furthermore, it is unlikely that the program of the Association will be frozen. The threat of a nationalized system of compulsory health insurance may at any moment require the expenditure of large sums of money to help protect the public and the profession from an unsound health program.

Last October the House of Delegates approved a recommendation that active membership dues be increased from $12 to $20. That proposal must be given serious consideration by the delegates at the 91st annual session next fall. Facts must be faced realistically and appropriate measures taken that will enable the Association to continue to meet its increasing responsibilities.

## A questionable approach to the relation between sugar and dental caries

Dental caries through the ages has been a fascinating and complex problem. Its relationships and ramifications are so numerous that, even now, few factual conclusions have been gained upon which there is a general agreement.

In the development of present-day concepts there have been widely divergent schools of thought, from theories of "lush grass eaten by cows" to psychologic impacts of unrequited love.

Recently, however, the relationship of sugar intake has come to the forefront in many discussions of the subject. By animal and human experimentation it has been demonstrated that caries can be prevented almost completely by elimination of sugar from the diet. This has been so convincingly demonstrated that few deny the validity of the relationship. Sporadically, however, objections have been raised and contrary opinions expressed. In some instances these opinions are based on observations of races or tribes whose sugar consumption is compared with caries activity. Unfortunately, such observations are often subject to grave error and, therefore, in the deductions drawn from them. Mass statistics are often as misleading as was the Gallup poll in the presidential election.

Recently, H. H. Neumann, M.D., who is a world traveler and who has observed dental caries among various races of people, has expressed the opinion, in both a British dental journal and an American dental publication,[1] that hardness of the diet, or its texture, is a more important factor in the disease than the sugar consumption. He bases this assumption on the data obtained from four Scandinavian countries in which sugar consumption during World War II was drastically reduced. It is reported that in Denmark and Sweden sugar supplies were reduced 62 and 50 per cent respectively. In the former country, caries decreased only 7 per cent and in the latter 17 per cent. In Norway and Finland the supply of sugar was reduced 60 and 76 per cent respectively, and the caries rate dropped 78 per cent in Norway and 80 per cent in Finland.

This is an interesting observation, but precisely what does it mean? Dr. Neumann offers it as evidence that the caries rate does not follow sugar consumption and states as his belief that the lower caries rates in Norway and Finland are due to the hardness of the breads consumed in these countries during the war period. He also cites low caries rates in Italy and Sicily where the staple diet, spaghetti, rice and bread (hardness unspecified), would be highly fermentable.

Any scientific approach to such a concept should include a careful evaluation of the validity of the data upon which the conclusions were drawn. Is there any significance in the fact that Denmark and Sweden produce a large part of their own sugar, while Norway and Finland do not?

Visitors from Sweden tell us that during the war, although their sugar was rationed, they suffered no shortage of that commodity. They had unrestricted sale of their highly sweetened rolls and pastry which they habitually consume at all hours of the day. They had no chocolate, but they had unlimited quantities of sweet mentholated wafers which were sucked by young and old, in school, in the theaters, and even in church.

These facts raise an honest doubt as to the actual amount of sugar consumption in Sweden during the war years. In Norway and Finland the situation was different. Sugar privation was apparent and the people were greatly disturbed by it. From this distance it is not possible to ascertain all the factors involved in the wartime sugar rationing in these countries, but there is enough evidence to question the validity of the figures upon which Dr. Neumann's conclusions were based.

Furthermore, in his reference to caries rates in Italy and Sicily, he seems to have overlooked the fact that in many areas of these countries the water supplies contain appreciable amounts of fluorine, sufficient to reduce the caries attack rate in spite of carbohydrate ingestion. It is highly probable that fluorine would exert a much greater controlling effect than the physical properties of the diet.

The report, apparently, is based on observation rather than on scientific investigation. The author presents no scientific data to support his views. It may be just a coincidence that Dr. Neumann, who is relatively unknown in the field of dental research, publishes his "observations" at a time when the sugar distributors are becoming concerned at loss of sales because of public recognition of the proved relationship between sugar and dental caries.

This article is another illustration of the dangers of drawing conclusions from incomplete and unsupported generalizations. Certainly, more convincing data must be submitted before we would be justified in discarding other well documented evidence which clearly points to a positive relationship between sugars and dental caries.

1. Dental Survey, April 1950

## The Journal is redesigned

Beginning with this issue, the first number of Volume 41, THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION is published with a completely new format. The new design is in keeping with the constantly improving standards of dental journalism and modern typographical trends. No change has been made in the arrangement of the sections as the formula which has been in effect for the past several years seems to meet the needs of most members satisfactorily.

Members may be assured that the editorial staff will not only endeavor to maintain the present high publication standards of THE JOURNAL, but will strive constantly to present the material in an attractive manner in order to meet the needs of the profession.

## Cumulative Index to Dental Literature now published quarterly

The Bureau of Library and Indexing Service inaugurated in May an important change in the publication schedule of the *Index to Dental Literature* which will greatly increase its usefulness. Since 1921 bound volumes of the *Index* have been published at three to five year intervals which has resulted in a discouraging time lag between the date of publication of many articles and their listing in the *Index*. In 1933 the Association supplemented the service by furnishing subscribers with monthly cards containing listings of current dental articles. Although the card system improved the value of the *Index* tremendously, it had the disadvantage of being both bulky and costly. Under the new plan the *Index to Dental Literature* will be published cumulatively every three months. At the end of the year the material will be published in bound form.

This latest improvement in the index service has several advantages. It provides librarians, researchers and other subscribers with current information in compact printed form, permits subscribers to discard the bulky, easily misplaced cards, and reduces the cost of the service from $60 to $30 per year. The new quarterly cumulative publication schedule, the new format and the reduction in cost will enable more members to take advantage of the service and will place dentistry in the forefront of scientific organizations in indexing their literature.

# *Washington News Letter*

The final session of this 81st Congress is well into the home stretch with prospects that there will be a flurry of action on health legislation in the last weeks before adjournment. It is nonetheless certain that the more disputed bills that are pending, particularly those involving compulsory or voluntary health insurance, will die with the 81st Congress but their principles will go strongly marching on into the election campaigns throughout the country this fall with expectations that some members of the new Congress will continue to push health legislation.

Washinton events that will engage the attention of dentistry in July, and possibly August if the Congressional session lasts until then, are: approval or disapproval of President Truman's reorganization plan for establishment of a Department of Health, Education and Security, to be headed by Oscar R. Ewing; enactment or defeat of legislation authorizing government subsidies for medical and dental schools; public hearings on various national health insurance proposals; size of appropriations to be made for federal grants in aid for dental research and caries control programs in the fiscal year beginning July 1.

Another coming event to be watched is the Conference on Aging, sponsored by the Federal Security Agency, to be held in the Capital August 13-15. Announcement was made in June by FSA Administrator Ewing, who disclosed that he had been directed by President Truman to arrange this special symposium on health, economic and social problems of that segment in the 65-and-over class. The discussion group on health maintenance and services, one of ten categorical groups being formed, will deal with medical and dental aspects.

## NEW HEALTH LEGISLATION

A bill (HR 8746) introduced on June 7 in the House by Rep. Charles A. Wolverton (R., N. J.) is the newest legislative alternative for compulsory health insurance to be presented to Congress. Unlike all of the other pending bills on the subject, which place administration in hands of the Federal Security Agency and the U.S. Public Health Service, the Wolverton idea provides for establishment of an independent Federal Health Reinsurance Corporation. Patterned after lines of the Federal Deposit Insurance Corporation, this Agency would reinsure Blue Cross and Blue Shield services for the ultimate purpose of liberalizing contract benefits to the benefit of subscribers.

The scheme is substantially the same one that has been advocated recently by Harold E. Stassen, president of the University of Pennsylvania and a Republican candidate for presidential nomination in 1948.

## PUBLIC WATER FLUORIDATION

A resolution recommending fluoridation of public water supplies, contingent upon approval by local dental and medical societies, was adopted by the third annual conference of state dental directors in Washinton June 7-9. The meeting was held with officials of the Public Health Service and Children's Bureau.

Enlivening the discussion was recurring mention of the Forsyth Dental Infirmary in Boston, whose federally-financed dental nurse training project is in line with the New Zealand system of permitting women non-graduates to fill children's teeth.

### GI BILL DENTAL STUDY

Although a public hearing was held June 1 by a subcommittee of the House Veterans Committee on the bill (HR 7235) which would, in effect, dissolve the entrance deadline for ex-GI's who wish to take up dental training, prospects are dim that the measure will be enacted. The bill, amending the "GI Bill of Rights," provides that the period which a prospective medical or dental student spends on an institution's waiting list shall not be counted in the reckoning of his eligibility.

### DENTAL MATERIALS REPORT

The National Bureau of Standards has published Technical Report 1437, accompanied by 11 photographic illustrations, summarizing progress in its investigations of dental-amalgam alloys, gold alloys, silicate cements, denture resins and other dental materials. The Bureau's work in this field dates to 1919 and has received ADA support since 1928. "The efforts of the staff of chemists, physicists and dentists maintained at the Bureau by the ADA," says the report, "have contributed greatly to the success of the program, and the Dental Association's participation has developed into one of the major research activities of the Association." Copies of the report and illustrations are available upon request to the National Bureau of Standards, Washington 25, D.C.

### VETERANS ADMINISTRATION

Veterans Administration reported that as of the middle of May, applications for dental services were being received at the rate of 80,000 monthly, resulting in officials' anticipating the greatest backlog ever experienced. The jam will not be broken before July 1 when funds for the new fiscal year become available for the work.

# *News of Dentistry*

## A.D.A. Affairs

### JULY 15 DEADLINE FOR 1950 EXHIBIT APPLICATIONS

Hermann Becks of Berkeley, Cal., chairman of the A.D.A. section on scientific exhibits, has announced that a deadline of July 15 has been set for applications for space and motion picture time at the 91st annual session of the American Dental Association.

Approximately 50 scientific exhibits and 50 motion pictures are planned for the October 30 to November 2 meeting in Atlantic City. Application forms may be obtained from Donald A. Washburn, director of scientific exhibits, at the A.D.A. Central Office.

### EARLY RESERVATIONS URGED FOR ATLANTIC CITY SESSION

A record-breaking attendance has been predicted for the 91st annual session of the American Dental Association at Atlantic City, October 30 to November 2, and it is advised by Harold Hillenbrand, A.D.A. secretary, that reservations be made early in order that preferences for hotels can be granted.

Priority classifications will not be used this year. Reservations will be made as closely as possible to the preference of the visitor, with all reservations being handled by the A.D.A. Housing Bureau. The applicant will receive confirmation of his reservation directly from the hotel.

Official reservation application forms may be found in this issue of THE JOURNAL and in each succeeding issue up to convention time. Accompanying the forms are detailed maps indicating hotel locations and rates.

Nineteen Atlantic City hotels face the sea and overlook the famous boardwalk that stretches eight miles along the sandy beach. There are 20 other fine hotels to choose from, all near the boardwalk.

Officials of the A.D.A. and members of the Committee on Local Arrangements, headed by Edward R. White, Jersey City, have selected the Traymore and Claridge as official hotels.

Reservation application blanks should be mailed to the A.D.A. Housing Bureau, 16 Central Pier, Atlantic City, N. J.

### DIRECTORY OF ALL DENTISTS DUE FOR FALL PUBLICATION

The new American Dental Directory, containing a complete listing of all dentists in the United States and its territories, as well as a list of accredited dental schools and many other features, will be published in November, according to an announcement by John J. Hollister, business manager for the American Dental Association.

The second edition of the directory follows the initial publication in 1947, and continues to fill a need of long standing in providing, under one cover, a great amount of pertinent information on dentists and dentistry. All living dentists, A.D.A. members and non-members, have been listed when verification was possible. Easy reference is a feature by the alphabetical list of names and also a complete listing of dentists by city and state.

The price of the new directory is $12.50, with a discount allowed for all orders placed before publication. The volume is available to all dentists and those persons concerned with the profession. Checks or money orders sent before

publication at the rate of $10 per volume, should be addressed to the Order Department, American Dental Association, 222 East Superior Street, Chicago 11.

### BACK ISSUES OF JOURNALS WANTED BY CENTRAL OFFICE

The Business Office of the American Dental Association has issued a request that members who hold certain back issues of THE JOURNAL and its predecessors, the *Official Bulletin* of the National Dental Association and the *Journal* of the National Dental Association, notify the Central Office as to their willingness to sell the magazines for one dollar per copy.

The entire volume of the *Official Bulletin* of the N.D.A. for 1914 is needed, as well as all 1915-16 copies of The N.D.A. *Journal*. In August 1922 the title was changed to THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. Copies desired for 1926 include all but March and June. For 1927, January, July, August, November and December are wanted; for 1928, September; 1929, January and May; 1931, January, June and October; 1932, January and February; 1934, April, May and June, and 1945, April.

Members are requested to send a postcard to the A.D.A. Business Office describing the number of copies they desire to release. They will then be notified as to the correct total to submit.

### INDEX TO DENTAL LITERATURE AVAILABLE ON SUBSCRIPTION

The first issue of the *Index to Dental Literature*, a quarterly publication of the A.D.A. Bureau of Library and Indexing Service, is now available, it has been announced by Donald A. Washburn, A.D.A. librarian.

Sold on a subscription basis for $30 a year, the *Index* is cumulative so that each issue after the first will contain all the material that appeared in the preceding issues. The fourth issue, indexing the entire list of material for the year, will be case bound.

The *Index* replaces the former triennially published volumes. The Bureau has also discontinued the issuance of the monthly reports on cards, an unnecessary procedure because of the publication of the new quarterly cumulative index.

Subscriptions should be addressed to the American Dental Association, Subscription Department, 222 East Superior Street, Chicago 11.

### NEW MEMBERSHIP PAMPHLET NOW AVAILABLE

The Bureau of Public Information, in cooperation with the Council on Membership, has published a new booklet on membership and activities of the American Dental Association.

The pamphlet, covering the benefits and meaning of A.D.A. membership, is being distributed to deans of dental schools and to secretaries of constituent dental societies. A.D.A. members may receive copies on request to the Association's Central Office, 222 East Superior Street, Chicago 11.

### A.D.A. SECRETARY TO PARIS FOR F.D.I. MEETING

Harold Hillenbrand, secretary of the American Dental Association, has left for Europe, where he will attend the 50th anniversary meeting of the Federation Dentaire Internationale in Paris and the meeting of the American Dental Society of Europe in Amsterdam, and extend the good wishes of organized American dentistry.

Dr. Hillenbrand is scheduled to address two meetings during the Paris session, which will occupy the period from July 23 to 30. Before his return to Chi-

cago on August 1, Dr. Hillenbrand will visit and speak before dental schools and societies in England and on the Continent.

## ALL ACCREDITED SCHOOLS NOW IN APTITUDE TESTING PROGRAM

All accredited schools are now cooperating in the aptitude testing program conducted by the A.D.A. Council on Dental Education, in addition to the new schools at the University of Alabama and the University of North Carolina, according to Shailer Peterson, Council secretary.

The aptitude testing program was initiated with the freshman dental classes in 1946, at the request of the dental schools. At the A.D.A. session in San Francisco last October, the House of Delegates authorized the Council to place the program on a national basis. The value of employing tests as a means of predicting student success has been shown by the four-year experimental program just concluding.

## GRADUATE COURSES LISTED IN EXTENSIVE STUDY

As a result of many requests received by the Council on Dental Education for informative material relative to graduate, postgraduate and refresher courses offered by various schools, and in the Army and Navy educational programs, the Council's secretary, Shailer Peterson, and his staff, have prepared an extensive report on existing courses and those for which facilities are available and which could be established should the demand arise.

Statements on graduate and postgraduate work were collected several years ago, but this is the first time such an extensive and comprehensive study has been made, according to Dr. Peterson. The study not only includes titles of courses but also lists degrees or certificates given and the length of each course. A table is included for use as an index and as a means of obtaining names and addresses of schools in which the student might be interested.

The report shows a total of 150 graduate courses, 228 postgraduate courses, 143 refresher courses and 377 new or potential courses in addition to several programs of advanced work not listed in specific sections. The reports are available in limited quantities upon request to Dr. Peterson at the A.D.A. Central Office.

## A.D.A. COUNCIL TO EVALUATE FOREIGN DENTAL SCHOOLS

The Committee on Foreign Credentials of the A.D.A.'s Council on Dental Education is expanding its study of the progress and achievement of foreign dental schools and of foreign graduates who come to the United States for further study.

During the past 10 years, considerable information has been gathered in a survey of the scholastic abilities of 385 foreign students who have studied in American dental schools. About 150 foreign dental schools were reported as having had students in this country for postgraduate study, but conclusive information on their dental training in their homelands is not available.

In an effort to gather the needed information, William Hodgkin, chairman of the Committee on Foreign Credentials, now plans with his committee to prepare an abbreviated set of report forms covering foreign dental schools. These forms will be carried by volunteers traveling abroad, men interested in dental education who will be in a position to visit the schools and record the necessary information. American dental school graduates now residing in foreign countries will also assist in making this evaluation for the Council on Dental Education.

# Dental Societies

## LIST GROWS OF SOCIETIES OPPOSING FORSYTH PROJECT

Three Atlantic Coast dental societies have passed resolutions in opposition to government sponsored dental hygienists training programs such as the one instituted at Forsyth Dental Infirmary in Boston.

At its annual meeting early in May, the House of Delegates of the Massachusetts Dental Society voted 45 to 27 against the project now underway at Forsyth. The House of Delegates is now "on record as disapproving the project." At a May 26 meeting of the Board of Trustees, members unanimously went on record in support of House Bill 2034 to repeal the act found under chapter 473 of the General Laws of the Commonwealth relative to the Forsyth project.

At a meeting of the Board of Directors of the Seventh District Dental Society of New York on May 7, a resolution was adopted that placed the society "on record as being opposed to government sponsored and financed dental training projects of the character of that initiated at the Forsyth Dental Infirmary as being definitely detrimental to the dental health of the American children." The resolution urged that the project be abandoned.

The New York State Society of Dentistry for Children has also gone on record as being opposed to such government financed projects because of the belief that substandard dentistry will result from the "invasion by great numbers of unqualified dental practitioners."

The project was started last year under the sponsorship of the Massachusetts Department of Public Health and the U. S. Children's Bureau. The object is to provide two years training for a group of young women to prepare them to "fill cavities in children's teeth under the supervision of a registered dentist."

## TENNESSEE PRESENTS EIGHTH ANNUAL DENTAL SEMINAR

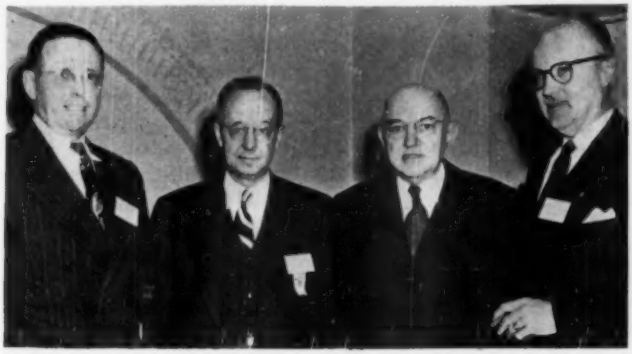
The eighth annual Postgraduate Dental Seminar, presented by the Tennessee State Dental Association in cooperation with the State Department of Health, began on June 19 and will conclude on July 14. Practice management, oral diagnosis and treatment planning are the subjects of this year's study.

The lectures and demonstrations are being held in a total of eight Tennessee cities on successive dates. The concluding session will be held July 12 to 14 at the Hotel Peabody in Memphis.

During its recent convention in Milwaukee, the Wisconsin State Dental Society, in cooperation with the General Electric X-Ray Corporation of Milwaukee, provided free bitewing roentgenograms to groups of Boy Scouts, Girl Scouts and other child organizations. This unit was set up in a central downtown building lobby, with Marquette University dental hygiene students serving as attendants and technicians. The program also included instruction in mouth hygiene and tooth care

Harry B. McCarthy, director of clinics and professor of practice management at the University of Maryland Dental School, is lecturing and instructing in practice management. Bernard O. A. Thomas, executive officer of the department of periodontology, University of Washington, is devoting the major portions of his lectures to diagnosis and treatment planning. The two seminar instructors are integrating their lectures.

Those interested in attending the remaining July sessions should contact the seminar's director, C. L. Sebelius, D.D.S., 420 Sixth Avenue, North, Nashville, Tenn.



Participants in the program of the Kentucky State Dental Association meeting in early spring were, left to right, Frank H. O'Halloran, president of the Indiana State Dental Association; Philip E. Adams, president, American Dental Association; Robert P. Thomas, A.D.A. trustee, sixth district, and J. L. Walker, retiring president of the Kentucky State Dental Association

## ALASKAN SOCIETY TO HOLD FIRST CONVENTION IN AUGUST

At a recent meeting of the executive council of the Alaska Territorial Dental Society, it was voted to hold the society's first annual convention on August 2, 3, and 4, at Anchorage, according to an announcement by C. N. Hoveland, secretary-treasurer.

R. D. Livie of Anchorage, is president, and J. O. Whaley, Ketchikan, vice-president. The executive council is composed of Howard Hughes, Fairbanks; Russell Wagner, Seward, and Joyce Smith, Juneau.

The Alaska Territorial Dental Society's address is Box 1262, Anchorage, Alaska.

## CHICAGO SOCIETY HAS NEW EXECUTIVE SECRETARY

Karl Richardson, formerly executive secretary of the American Congress on Obstetrics and Gynecology, has been appointed to an equal position with the Chicago Dental Society and assumed his new duties on June 1. He replaces L. Russell Hegland, who resigned to accept the position as executive secretary of the Montana State Medical Society.

Mr. Richardson is a native of Ottawa, Ill., and is a graduate of the University of Michigan, graduating in 1931 with a degree in business administration and accounting. He had been executive secretary of the medical congress since 1940.

### MISSOURI, KANSAS DENTISTS ELECT NEW OFFICERS

The Missouri and Kansas State Dental Associations held a joint meeting in the Municipal Auditorium, Kansas City, Mo., from May 7 to 10, to elect officers and to present an excellent program of table clinic demonstrations and group meetings.

By the end of the closing day, approximately 2,000 had registered, many of whom heard A.D.A. President Philip E. Adams, and Trustees Robert P. Thomas and Willard Ogle present reports of A.D.A. affairs. Senator Lester C. Hunt (D., Wyo.) spoke to an audience of 350 people on legislative trends of health service.

The Missouri State Dental Association elected the following officers: E. E. Haverstick, president, St. Louis; A. F. Schopper, president-elect, Kansas City; B. O. Haun, first vice-president, St. Louis; R. J. Hampton, second vice-president, Kansas City; Jack Grant, third vice-president, Joplin, and Reuben R. Rhoades, secretary-treasurer, Jefferson city.

New officers of the Kansas State Dental Association are H. J. Edwards, president, Arkansas City; Frank C. Carothers, president-elect, Garnett; Fred A. Richmond, secretary, Kansas City, and Stanley H. Flickinger, treasurer, Baldwin.

### NEW YORK SOCIETY FORMS ATOMIC ENERGY COMMITTEE

The First District Dental Society of New York has formed an Atomic Energy Program Committee, charged with the administration of an atomic energy policy pertaining to the dental profession.

Theodore Kaletsky, Jamaica, is chairman of the committee which will stimulate atomic energy research in its relation to dentistry. Through the official journal the society will make available for the first time fundamental literature on the subject. Reprints will be made and distributed on request.

In attempting to obtain young men interested in research in this field, the society is offering a prize of $100 for the best essay presented by any senior student on "Atomic Energy and Its Relation to Dentistry." Other prizes may be offered to interns and graduates in the near future.

## Dental Education

### PERIODONTIA FELLOWSHIP OPEN AT GEORGETOWN UNIVERSITY

The Department of Periodontia of Georgetown University School of Dentistry has announced the availability of a fellowship in periodontia to begin in August, with a stipend of $200 a month.

The fellowship will afford an opportunity for clinical instruction and the study of a wide variety of cases. A certificate will be awarded upon satisfactory completion of the study.

John P. Burke, dean of the dental school, has requested that applicants submit an educational and personal resumé together with a small photograph, to Georgetown University School of Dentistry, Washington 7, D. C.

### M. DON CLAWSON RELINQUISHES MEHARRY MEDICAL PRESIDENCY

M. Don Clawson, president of Meharry Medical College, has been granted a release from his duties and given a one year sabbatical leave, after which he plans to re-enter the dental profession as an active member.

Dr. Clawson had requested the Meharry Board of Trustees that his wish to be relieved of the presidency be granted. The board also adopted his recommendation that Robert A. Lambert, recently retired medical director of Rockefeller Foundation, be named chairman of a committee to administer the college until a president can be chosen. Dr. Clawson had been connected with Meharry since 1942, when he joined the faculty as director of dental education. He became president of the college in 1945.

### R. W. McNULTY NAMED DEAN OF U.S.C. DENTAL SCHOOL

Robert W. McNulty

Robert W. McNulty, dean of Loyola University's Chicago College of Dental Surgery, has been appointed dean of the University of Southern California School of Dentistry and will begin his duties on September 1. The School has been administered since February by a faculty committee headed by Rex Ingraham.

A recognized national leader in dental education, Dr. McNulty is chairman of the Council on Dental Education of the American Dental Association. He has been on the council three years, and recently was nominated for another term. He has held administrative positions with the Loyola dental school for 22 years, serving as assistant dean from 1938 to 1943, acting dean the next year, and as dean the past six years. He has taught clinical dentistry, dental anatomy, practice management and dental history in the college since 1926.

Dr. McNulty is a former president of the Illinois State Dental Society, a Fellow of the American College of Dentists, a member of the executive committee of the Federation Dentaire Internationale, and a former member of the board of governors of the National Research Council's Committee on Dentistry. He was graduated from the Chicago College of Dental Surgery in 1926 with the degree of D.D.S., and obtained a master's degree in education from Loyola University, Chicago, in 1932. Before entering the field of dental education, Dr. McNulty was a chemist for four years. His original college study was in chemistry and biology at Hanover College, Hanover, Indiana.

### U. OF ILL. DENTAL COLLEGE ADDS THREE TO FACULTY

The University of Illinois College of Dentistry has appointed three new members to the faculty, it has been announced by Dean Allan G. Brodie. The new members are: Marvin S. Burstone of St. Louis; William W. Wainwright of Los Alamos, N. Mex., and Henry Glupker of Chicago.

Dr. Burstone is the winner of the 1950 essay contest of the Chicago Dental Society for his paper on the harmful effects of radioactive phosphorus on the teeth and supporting structures. He has been an instructor in oral pathology at Washington University's Schools of Medicine and Dentistry.

Dr. Wainwright will assume his new position on September 1 as professor and head of the department of radiology. He has served as radiobiologist at the Los Alamos Scientific Laboratory of the University of California since 1948. With his appointment, Illinois will offer new undergraduate courses in roentgen ray technic, interpretation and diagnosis. A native of San Francisco, Dr. Wainwright has been associated with the University of California since 1929.

Dr. Glupker will hold the rank of asso-

ciate professor of full and removable partial dentures, and will be associated with the University's training center in the rehabilitation of the cleft lip, cleft palate child. He taught denture prosthetics at Loyola University, Chicago, from 1925 to 1945. He has since devoted himself to private practice and to rehabilitation work in the field of cleft palate.

### A. R. BARALT APPOINTED DEAN OF LOYOLA DENTAL IN CHICAGO

A. R. Baralt, Jr.

A. Raymond Baralt, Jr., associate professor of crown and bridge prosthesis and secretary to the faculty at Temple University School of Dentistry, has been appointed dean of the School of Dentistry, Loyola University, Chicago College of Dental Surgery, and will assume his new duties on September 1.

Dr. Baralt, at 32 years of age, is one of the youngest educators in dental history to be named dean of a school of dentistry. He succeeds Robert W. McNulty, who has accepted the position as dean of the College of Dentistry, University of Southern California.

Dr. Baralt earned his D.D.S. degree from Temple University in 1942 and in 1943 opened an office for general practice in Philadelphia. In 1945 he joined the faculty at Temple as a part time instructor in prosthetic dentistry, and a year later devoted full time to that department. He has filled a dental residency at Philadelphia General Hospital and for a year was assistant oral surgeon at St. Mary's Hospital in Frankfort, Pa.

Dr. Baralt is a member of the American Dental Association, its component and constituent societies and is active in the A.D.A.'s Committee on Aptitude Testing. He holds membership in and is affiliated with many national professional groups in addition to the Federation Dentaire Internationale.

### POSTGRADUATE COURSES IN 23 SUBJECTS AT PENNSYLVANIA

The School of Dentistry, University of Pennsylvania, is offering 36 postgraduate courses in 23 different subjects during the year 1950-51 including several in the field of oral surgery.

Enrollment is limited to members in good standing of the American Dental Association, and courses may be taken under the provisions of Public Law 346. The second Mid-Atlantic States Seminar in Oral Medicine at Skytop, Pa., also is being offered by the dental school. The seminar will be held November 5 to 10, immediately following the A.D.A. meeting in Atlantic City. In addition to the postgraduate courses offered by the school, extension courses can be arranged for professional groups who wish to receive instruction in their own localities.

Detailed information on all courses may be obtained from the Director, Postgraduate Courses, School of Dentistry, University of Pennsylvania, 4001 Spruce Street, Philadelphia 4.

## Legislation

### AMENDMENT CHANGES BILL ON PATHOLOGY BUILDING

The amendment to an A.D.A.-supported bill to construct a new building for the Army Institute of Pathology was signed by President Truman in May, changing the location of the building and reducing the total cost to save a total of a quarter million dollars.

The original law, enacted by the 80th Congress as Public Law 626, called for the building to be constructed at a cost of $600,000 and to be located at Forest Glen, Md. The amendment, Public Law 495, as passed in the second session of the 81st Congress and signed by the President, directs that the appropriation be decreased to $350,000 and that the Army Institute of Pathology building be located at the Army Medical Center, Washington, D. C.

### MASSACHUSETTS LEGISLATURE AGAINST SOCIALIZED MEDICINE

The house and senate of the state of Massachusetts last spring passed a resolution memorializing the United States Congress not to attempt to subject the American people to any form of compulsory health insurance. The resolution was recorded in the Congressional Record on Friday, March 24.

Previously at least one house of the legislatures of the following states passed similar resolutions: Nebraska, Arkansas, Tennessee, Utah, Florida, Delaware, Michigan, Maryland, Texas and Illinois.

### HR 647 SUBMITTED TO KILL REORGANIZATION BILL

A plan submitted by President Truman to Congress to transfer the functions of the Federal Security Agency to a prospective Department of Health, Education and Welfare, had been temporarily made impotent by House Resolution 647, introduced by Rep. Richard Hoffman (R., Mich.) as THE JOURNAL went to press.

The Truman proposal would combine all health activities with education and welfare plans, thus refuting the Hoover Commission's recommendation that a separate "United Medical Administration" be set up. The integration of health with educational and welfare activities is also in direct opposition to principles and beliefs of the American Dental Association and the American Medical Association.

## Public Health

### U.S.P.H.S. RECOMMENDS PUBLIC WATER FLUORIDATION

A U. S. Public Health Service recommendation that artificial fluoridation of public water supplies be "encouraged" in an effort to reduce the prevalence of dental caries was announced by Assistant Surgeon General Bruce D. Forsyth on June 9. A day earlier, in Washington, state and territorial dental directors unanimously recommended the fluoridation procedure.

Dr. Forsyth reported that "preliminary data indicate a lowered amount of dental decay following fluoridation of the public water supply." The statement recommended, however, that "although evidence which tends to substantiate the usefulness of this procedure is rapidly accumulating, the controlled study now being carried on in Grand Rapids, Michigan, should be continued."

Suggesting that "others be inaugurated when considered necessary," it said: "In order to utilize this preventive at the earliest possible moment, therefore, fluoridation of public water supply as a procedure for the partial control of dental caries can be encouraged subject to the approval of the state and local health authorities and the dental and medical professions."

In their approval of the program, the state and territorial dental directors

adopted a resolution at their third annual conference recommending fluoridation "where the local dental and medical professions have approved this program and where the community can meet and maintain the standard required by the state health authority."

The Public Health Service statement followed one made by Dr. Forsyth a few days earlier, appearing in the A.D.A. *News Letter* of June 1, which asserted: "Using scientific methods and procedures, communities desiring to fluoridate their communal water supplies should be strongly encouraged to do so." Dr. Forsyth said that artificial fluoridation was found to be as effective in reducing dental caries as water naturally containing fluorides.

### DENTAL HEALTH DIRECTORS HOLD THIRD ANNUAL MEETING

The State and Territorial Dental Health Directors Association, an organization composed of dental directors from state and territorial Public Health Services, held their third annual meeting in Washington, D.C., June 7, under the presidency of Ernest A. Branch.

The association's annual meetings are called and sponsored by the U. S. Public Health Service for the purpose of discussing problems in individual states and territories. This year's meeting was held in conjunction with the Public Health Service and the Children's Bureau.

### DENTISTS OFFERED OVERSEAS POSTS IN PUBLIC HEALTH

To meet the increasing demand for experienced health personnel to staff technical health missions overseas, as authorized by Congress, the Division of International Health, Public Health Service, is developing an intensive recruiting program to include dentists.

Members of technical health missions will assist foreign governments in establishing public health training, initiate health demonstrations, supervise specific projects and serve in an advisory capacity to foreign government officials in health matters.

Assignment will be made in the higher grades, and additional compensation will be provided in the form of allowances for overseas service. The Division of International Health is keenly interested in establishing a roster of highly qualified dentists to fill the requirements when foreign health missions are initiated.

Application forms and further details may be secured by addressing the Chief, Division of International Health, Public Health Service, F.S.A., Washington 25, D. C.

## Research

### GOTTLIEB'S THEORY CONTRADICTED BY N. Y. STUDY

A year-long study, conducted by David B. Ast, in association with Arthur Bushel, assistant New York state dental director, was made of 179 boys and girls between the ages of 12 and 15 in two high schools in Schenectady and Albany which has resulted in the first authoritative refutation of the Gottlieb theory.

For a control, half the mouth was untreated, and the other half (upper and lower teeth) was treated as prescribed by Gottlieb, after the entire mouth had been cleaned and roentgenographed. Dr. Ast reported that on the untreated side, 28 per cent of the upper caries-free teeth became carious after one year, and on the treated side, 24.8 per cent became carious. For the lower teeth, 17.3 per cent of the untreated side showed caries, and 17.5 per cent of the treated side became carious.

For all surfaces, the total for upper and lower showed that 7.8 of the un-

treated side became carious and 7.4 of the treated side had developed caries.

### M. E. LAWSON, JR. NEW A.D.A. AID AT BUREAU OF STANDARDS

M. E. Lawson, Jr., formerly a research associate with the American Petroleum Institute at the National Bureau of Standards, has been employed by the American Dental Association to work on a tooth enamel project at the Bureau, it has been announced by Harold Hillenbrand, A.D.A. secretary.

The employment of Mr. Lawson was on the recommendation of the Council on Dental Research for the special project "Basic Research Program on Physical and Chemical Properties of Enamel."

## International

### F.D.I. REPORTS 856 MEMBERS IN THE UNITED STATES

Oren A. Oliver, chairman of the United States Committee on Membership for the Federation Dentaire Internationale, has announced that the American roster now totals 856 paid-up members, all of whom will be eligible to attend the annual session of the F.D.I. to be held in Paris July 23 to 30.

Information on F.D.I. memberships and the Paris meeting may be obtained from Dr. Oliver at 1915 Broadway, Nashville, Tenn.

### AMERICAN DENTISTS INVITED TO SYDNEY DENTAL CONGRESS

Members of the American Dental Association are cordially invited by the Australian Dental Association to journey to the "Continent Down Under" for the Twelfth Australian Dental Congress to be held in Sydney August 21-25.

The invitation states that visitors will have the opportunity of reviewing the latest developments of dental practice by means of lectures, motion pictures, table clinics and demonstrations. A special feature will be the plenary sessions in which leading authorities will participate.

J. V. Hall Best, President of the Australian Association, has promised "not only great profit professionally, but the opportunity of enjoyment at social functions in the atmosphere of a great metropolis."

## Armed Forces

### GENERAL LOVE NEW CHIEF OF ARMY DENTAL CORPS

Maj. Gen. Walter D. Love, formerly Deputy Chief, Dental Division, Army Surgeon General's Office, was commissioned statutory assistant to the Surgeon General on Friday, April 14, following confirmation of his appointment by the U. S. Senate. Maj. Gen. R. W. Bliss, the Surgeon General, presented the commission to General Love, who replaces Maj. Gen. Thomas L. Smith upon the expiration of General Smith's four-year statutory term of office.

In his new dual post as Assistant to the Surgeon General and Chief of the Dental Division, General Love is responsible for all plans and policies for the administration of the army dental service in the United States and overseas.

The May issue of THE JOURNAL, in announcing the unveiling of General Smith's portrait, to be placed in the Army Medical Center, stated that he was the first dentist to attain the rank of Major General. This was in error. Maj. Gen. Robert H. Mills was appointed to that

rank in 1943 when he was Chief of the Army Dental Corps. His promotion from Brigadier General to Major General was temporary. General Smith is therefore the first dentist to attain the permanent rank of Major General.

## General

### WORLD HEALTH ASSEMBLY IN DENTAL HEALTH RESOLUTION

During the recent meeting of the World Health Assembly, a resolution headed "Dental Hygiene" was adopted which urged all research institutes concerned with the problem of dental health to collaborate with the World Health Organization in the study of the problem.

The resolution was included in the fourth report of the Committee on Program and was adopted at the seventh plenary meeting on May 25. It stated that since dental diseases are universal and affect adversely the health and efficiency of millions of persons throughout the world, a study of causes and preventive measures is in order. The resolution requested the Executive Board and the Director-General of the W.H.A. to study dental health conditions and to prepare a program for consideration by the Fourth World Health Assembly next year.

### THE NEGRO IN DENTISTRY THEME OF NEW BOOK

Final plans are underway for the publication of a book on the contributions of the Negro to American dentistry. The volume, under the editorship of Clifton O. Dummett, has been in preparation for many months and will soon be available for distribution.

Dr. Dummett is a former dean and director of dental education of the School of Dentistry, Meharry Medical College. Presently he is chief of Dental Services, Veterans Administration Hospital at Tuskeegee, Alabama.

The book will contain chapters written by the nation's foremost Negro dentists, physicians and surgeons. Subject matter will include "The Negro in Dental Research," "The Negro in Public Health Dentistry," and "History of the National Dental Association."

### SYRACUSE AUXILIARY FORMED WITH WORTHY OBJECTIVES

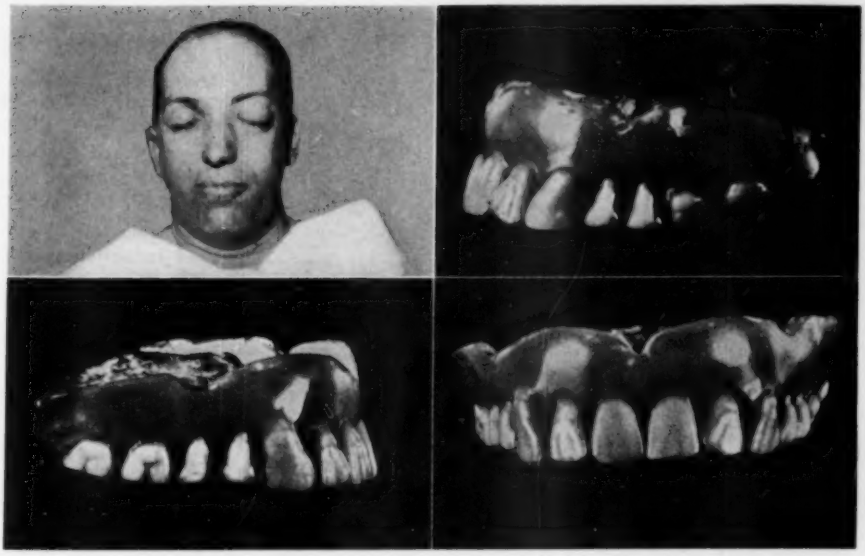
The newly formed Auxiliary of the Syracuse (N. Y.) Dental Society has been formed with a twofold purpose—to aid in any way possible the Cerebral Palsy Clinic, located in that city, and to aid the dental and medical professions in their opposition to compulsory health insurance.

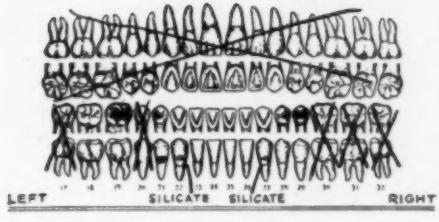
According to a communication from Mrs. Robert W. Hummer, chairman of the auxiliary's publicity committee, it is believed that there are but two other dental auxiliaries devoted to aiding the profession's fight against "socialized medicine and dentistry." The Syracuse group has expressed confidence that other dental societies' auxiliaries will be prompted to organize for the same cause.

### TOLEDO DENTAL DISPENSARY OFFERS SALARIED POSITION

The Toledo (Ohio) Dental Dispensary Association, a fully supported Community Chest Agency, has announced the opening of a position for a recent dental school graduate, with a salary paying up to $6,000 per year depending on age and experience of the operator.

Address all inquiries regarding applications to the Toledo Dental Dispensary Association, 1815½ North Thirteenth Street, Toledo 2, Ohio, or telephone Adams 4394.






Police at Baton Rouge, La., are attempting to identify this man and have enlisted the aid of dentists who might recognize the denture work. The unknown man apparently committed suicide in a Baton Rouge rooming house on April 7. All personal effects and marks of identification were missing. He was wearing a complete upper denture and had restorative work done on his lower teeth. A description of the denture follows: clear palate, Densene acrylic; approximately M48 or L48, 5 phase Veri-chrome anterior teeth; Trubyte posterior teeth; no rouge; palatal relief; right cuspid exposed above cervix, about 5 mm. with pronounced labial version; left posterior teeth crudely ground into occlusion with some type of large stone, with the right bicuspids similarly ground. If any dentist recognizes the victim or the dental work, he is urged to contact immediately Fred C. Parker, Jr., Chief of Police, Baton Rouge, La.

## 250 ATTEND MEETING TO PLAN CONFERENCE ON CHILD HEALTH

Representatives from approximately 150 national organizations met at the request of the Children's Bureau in the Federal Security Agency auditorium, Washington, D.C., May 25 and 26 to learn how their organizations can participate in the December White House Conference for Children.

The stated purpose of the winter conference is to consider the development of the child's "emotional and spiritual qualities essential to individual happiness and responsible citizenship and what physical, economic and social conditions are deemed necessary to this development." Lon W. Morrey, editor, represented the American Dental Association at the planning conference.

Present at the annual Illinois State Dental Assistants Association meeting in Rockford, May 6 and 7, were (left to right): Mrs. Nancy Saunders, Chicago, president; Marie Larson, Rockford's first and only woman dentist, who spoke on etiology and prevention of caries; Mrs. Gladys Triphahn, Chicago, sixth district trustee; Pat Erikson, Rockford, association secretary, and J. Franklyn Dailey, who talked on orthodontics for children.

### SOUTHERN ORAL SURGEONS FORM NEW SOCIETY

The Southern Academy of Oral Surgery was formed at an organizational meeting on March 19, prior to the annual Thomas P. Hinman midwinter clinic in Atlanta, Ga., with Robert F. Sullivan of Savannah, Ga., as president.

Charter officers elected in addition to Dr. Sullivan were: E. G. Bumgardner, vice-president, Columbia, S.C., and R. H. Roux, Jr., secretary-treasurer, Savannah, Ga. Appointed to the executive council were: C. T. Wells, Sr., representing North Carolina; M. L. Brockington, representing South Carolina; R. H. Blane, Tennessee; J. C. Hill, Georgia, and H. M. Robertson, Georgia. Two men are to be selected to represent Florida and Alabama.

The new society's first annual convention will be held in April 1951 at Savannah, Ga.

### ANESTHESIA RESIDENCY OPEN AT DOCTORS HOSPITAL, D.C.

A dental anesthesia residency for selected postgraduate students of dental surgery is being offered by Doctors Hospital, Washington, D.C., with appointments being made each January 1 and July 1. Length of service is for either six months or 12 months with maintenance.

The student will assist with general anesthesia for surgery and obstetrics and will participate in preoperative and postoperative routine care in the hospital. He will attend anesthesia conferences and lectures at least four hours a week and take part in daily clinical conferences in the operating room.

This opportunity is offered only to students who are working for a master's degree or who intend to specialize in oral surgery. The objective of the residency is to give a basic background in anesthesiology with clinical experience in 300 to 750 cases exclusive of dental surgery.

Further information on the residencies may be obtained by writing to Harold Krogh, D.D.S., 1835 Eye Street, N. W., Washington 6, D.C.

### ORTHODONTICS BOARD ELECTS NEW OFFICERS FOR 1950-51

At its meeting in Chicago, May 4 to 7, the American Board of Orthodontics elected new officers for 1950-51 and

granted certificates of specialty to 27 orthodontists.

Joseph D. Eby, of New York, was elected president, and Stephen C. Hopkins, Washington, D.C., was named vice-president. The new secretary is C. Edward Martinek, Detroit, and Reuben E. Olson is treasurer. Other officers of the board include Leuman Waugh, New York, Raymond L. Webster, Providence, and Ernest L. Johnson, San Francisco.

The next meeting of the board will be held in April 1951 at Louisville, Ky. Orthodontists who desire to be certified by the board may obtain application blanks from the secretary, Dr. Martinek, 661 Fisher Bldg., Detroit 2, Mich. Applications must be filed not later than March 1, 1951 for consideration at the Louisville meeting.

### LEON KRAMER, 55, DIES UNEXPECTEDLY IN KANSAS

Leon R. Kramer, director of the Division of Dental Hygiene of the Kansas State Board of Health, and nationally known public health official, died unexpectedly on May 21 at the St. Francis Hospital in Topeka, Kan. Death occurred a few hours after he had suffered a heart attack at his home in Topeka.

Dr. Kramer was born September 18, 1894 in Clay Center, Kan. He received his D.D.S. degree from the Kansas City-Western Dental College, Dental School of the University of Kansas City, in 1918, and the degree of Master of Science in Public Health at Columbia University in 1940. He practiced general dentistry at Hanover, Kan., from 1919 to 1936, when he was appointed head of the newly created Dental Division of the Kansas State Board of Health, the office held at the time of his death.

Dr. Kramer was a member of the Shawnee County (Kan.) Dental Society, the First District Dental Society of Kansas, the American Dental Association, the Kansas State Dental Association and many other professional societies in dentistry and public health. He was a faculty member of the Kansas City-Western Dental College and of the University of Kansas Medical School. He had written many papers on dental health and was a regular contributor to various dental publications. His work had earned him a national reputation.

### DEATH TAKES W. F. SHARP, CALIFORNIA EDUCATOR

William Fuller Sharp, for many years a member of the College of Dentistry, University of California, passed away in March at the age of 83 after a full life of teaching and practicing his profession.

Dr. Sharp was graduated from the University of California in 1890 with the D.D.S. degree, and received the D.M.D. degree after a year of graduate work at Harvard University. He returned to the University of California as an instructor in anesthesia, later joining the prosthetics staff and eventually becoming head of the prosthetics department. In 1927-28 he served as dean of the school.

Dr. Sharp is survived by his widow, four daughters, three grandchildren and a brother, James G. Sharp, former dean of the U. of C. dental school.

### HOWARD C. MILLER DIES AFTER BRIEF ILLNESS

Members of the dental profession were grieved to learn of the death of Howard C. Miller on May 18, 1950. Born August 25, 1893, in Grand Island, Nebraska, he was the son of Howard C. Miller, a pioneer dentist of that state. He was graduated with a D.D.S. degree from Creighton University in 1916 and was awarded an honorary LL.D. degree from that institution in 1944. Following two years in the general practice of dentistry in Omaha he enlisted in the Navy in 1918

and served as Lieutenant, senior grade, D.C., at Great Lakes Naval Training Station. In 1920 he located in Chicago and limited his practice to oral surgery.

Although he devoted the last thirty years of his life to his specialty he maintained a keen interest in the affairs of general dentistry. He served as secretary and president of the Chicago Dental Society, trustee of the American Dental Association and regent of the American College of Dentists. He was a past president of both the Chicago Society of Oral Surgeons and the American Society of Oral Surgeons. He was a founder member of the American Board of Oral Surgeons and its first president, a position which he held for the last five years. He was a member of the International College of Anesthetists, Odontographic Society of Chicago, and Delta Sigma Delta and Omicron Kappa Upsilon fraternities. He was the first editor of the oral surgery section of the *Year Book of Dentistry*, and held that position for seven years. He was a staff member of the Grant Hospital and head of the Oral Surgery Department of Henrotin Hospital. As chairman of the committee on journalism of the American Society of Oral Surgeons he was instrumental in effectuating an agreement between that society and the American Dental Association which resulted in the publication of the *Journal of Oral Surgery*.

Howard C. Miller

He is survived by his wife, Murrel, daughter Marilyn, and brother, Ralph.

## MOURN DEATH OF H. E. KING, DENTAL DEAN AT CREIGHTON

Herbert E. King, 68, dean of the Creighton University School of Dentistry at Omaha, Neb., passed away at his home in that city on May 11.

Dr. King was graduated from the Omaha Dental College (now Creighton's School of Dentistry) in 1905 and returned to join the faculty eight years later. He was named dean of the school in 1945.

Dr. King was an enthusiastic worker in the various dental societies, having served as secretary of the Nebraska State Dental Society from 1916 to 1929, with the exception of the year 1922 when he was its president. Immediately prior to his death, he had been active in the three-day meeting of the society that ended May 10. He was a Fellow of the American College of Dentists and, as a delegate to the American Dental Association, attended most national dental meetings. In 1944-45 he was first vice-president of the A.D.A.

Herbert E. King

In addition to his professional activities, Dr. King was a member of the Rotary Club, Delta Sigma Delta fraternity and served on the Omaha School Board for 13 years and as president of the board in 1937. He is survived by his widow, Nell, and a son, Charles H. King of Evanston, Ill.

# *International Correspondence*

## NEWS FROM GREAT BRITAIN

During March and April rumors were circulating among the dentists in Britain that an additional cut in their income was to be announced before May 1. Figures varying from 10 to 15 per cent were being suggested by those claiming to know. All doubts were dispelled on April 27 when the Minister of Health announced that regulations had been made for an interim reduction of 10 per cent in the remuneration of general dental practitioners for treatment under the National Health Service. The reduction applies to cases where the patient was accepted on or after May 1.

It will be recalled that it is over a year since the Penman Working Party obtained the cooperation of a small number of dentists who provided the party with information from which an effort was made to assess accurately the average time taken to carry out the various operations undertaken in the course of general dental practice. The object of the enquiry was to establish a time factor on which to base the fee for each operation so that the total annual net income would be in the region of £1600 ($4,480), the recommended average income of a dental practitioner in a state service. The information was gathered in April but before the figures could be analyzed and the report published the Minister of Health felt bound to economize and in June 1949 reduced the dental fees by 20 per cent. This was announced as a temporary scale and canceled the regulation which had been in force since the previous February which stated that all monthly incomes over £400 ($1,120) were to receive a cut of 50 per cent on the excess amount. In September the Penman Report was published. The government and the profession then commenced to negotiate but it was soon discovered that in order to obtain a really accurate picture of the average gross and net income the question of practice expenses would require to be more accurately known than the previously estimated figure of 52 per cent. It was agreed that this was a difficult figure to obtain accurately and that the most accurate figure would be in the possession of the tax collectors. This information is now being sought.

In the meantime, in view of the serious national economic situation, and the very high cost of the Health Service, economies had to be made and it was obvious to the Ministry that despite the previous cut the Local Executive Councils were paying dental practitioners more than the recommended average, so a further cut has been made. This is yet one more unilateral action by the Minister who has in this way cut the original scale of fees by 30 per cent. It should be remembered that the original scale of fees was so attractive that it influenced many dental practitioners to join the scheme just before or soon after the appointed day, July 5, 1948.

*John Boyes*

## NEWS FROM SCANDINAVIA

### NORWAY

The Council on General Scientific Research, founded last year by the Ministry of Education, recently decided to establish a Norwegian Institute of Dental Research. The dean of the College of Dentistry, Dr. I. Krohn, was appointed chairman of the Group for Medicine of the Council. It was also by the initiative and active interest of Dr. Krohn that the plan of establishing an Institute of Dental Research could be realized. He was supported in this task by the Department of Public Health Service as well as by the Norwegian Dental Association.

Until recently, dental research in Norway received a financial support of only 7.000 norw. crowns ($861) a year. Compared with this, the Institute of Dental Research starts with a budget of approximately 250.000 norw. crowns ($30,750).

The Board of the new institute consists of the following members: Dr. K. Evang, Surgeon General, Public Health Service; Dr. A. Ström, Professor in Hygiene, Norway University; Dr. S. Lossius, Professor in Oral Surgery, Norwegian College of Dentistry, and Dr. B. Ofstad, Norwegian Dental Association.

The latter is replacing Dr. B. Nygaard Östby, president of the Norwegian Dental Association, who was previously chairman.

At the meeting of the European Orthodontic Society in Switzerland last summer, Dr. Selmer-Olsen, head of the orthodontic department of the Norwegian College of Dentistry, was elected president of the society, which is going to have its next meeting in Norway, in 1951.

*Birger Nygaard-Östby*

## *Reports of Councils*

COUNCIL ON DENTAL HEALTH

# Children's dental health day: report on second national observance

The development of expanded community dental health programs to make dental health education and care available to all children was stressed across the nation Monday, February 6, in observance of National Children's Dental Health Day. In hundreds of communities, local and state dental societies arranged programs designed to stimulate public interest in improved dental health for children.

Today the dental profession has the knowledge and skill to prevent loss of teeth as a result of dental disease, provided there is whole-hearted cooperation by the individual patient. Through an observance such as Children's Dental Health Day, the dental profession hopes that public interest can be so stimulated that dental health education and treatment will become available to every child.

### PROCLAMATIONS

The growing awareness of the importance of dental health is evident by the fact that this year President Truman, 26 governors and 93 mayors issued proclamations calling attention to Children's Dental Health Day. Special impetus was given to this year's celebration by the presidential proclamation, which read in part as follows:

WHEREAS: The health of our children is of supreme importance to the future of the nation; and

WHEREAS: The prevention and early treatment of the dental diseases can be a potent factor in the promotion of the general health of our young people; and

WHEREAS: The joint resolution of Congress approved on February 1, 1950, provides as follows:

"THAT THE PRESIDENT OF THE UNITED STATES IS HEREBY AUTHORIZED TO ISSUE A PROCLAMATION SETTING ASIDE FEBRUARY 6, 1950, AS NATIONAL CHILDREN'S DENTAL HEALTH DAY AND TO INVITE ALL AGENCIES AND ORGANIZATIONS INTERESTED IN CHILD WELFARE TO UNITE UPON THAT DAY IN THE OBSERVANCE OF SUCH EXERCISES AS WILL CALL TO THE ATTENTION OF THE PEOPLE OF THE UNITED STATES THE FUNDAMENTAL NECESSITY OF A CONTINUOUS PROGRAM FOR THE PROTECTION AND DEVELOPMENT OF THE DENTAL HEALTH OF THE NATION'S CHILDREN";

NOW, THEREFORE, I, Harry S. Truman, President of the United States of America, do hereby designate Monday, February 6, 1950, as National Children's Dental Health Day; I also direct the appropriate agencies of the federal government and invite the state and local governments and organizations interested in child welfare to cooperate in programs designed to focus public attention upon the vital importance of preserving and improving the dental health of our children.

### VARIED ACTIVITIES

Reports were received concerning observances in Hawaii, District of Columbia and 46 states, as follows:

| | |
|---|---|
| Alabama | Montana |
| Arizona | Nebraska |
| Arkansas | Nevada |
| California | New Hampshire |
| Colorado | New Jersey |
| Connecticut | New Mexico |
| Delaware | New York |
| Florida | North Carolina |
| Georgia | North Dakota |
| Idaho | Ohio |
| Illinois | Oklahoma |
| Indiana | Oregon |
| Iowa | Pennsylvania |
| Kansas | Rhode Island |
| Kentucky | South Carolina |
| Louisiana | Tennessee |
| Maryland | Texas |
| Massachusetts | Utah |
| Maine | Vermont |
| Michigan | Washington |
| Minnesota | West Virginia |
| Mississippi | Wisconsin |
| Missouri | Wyoming |

The growing interest in this national observance is evident by the fact that in 1950, 46 states reported as compared with 27 in 1949 (see table). Owing to the limitations of space and the similarity of methods of observance in many areas, the activities in each state will not be given in detail. However, some of the high lights which might serve as suggestions for other communities will be mentioned.

### PARTICIPATING GROUPS

The number of outside groups that participated in the observance of Children's Dental Health Day indicates that the public as a whole is receptive to the efforts of the dental profession toward reducing the size of the dental health problem. The participating groups listed in the many reports are: hygienists and dental assistants, dental auxiliaries, city, county and state departments of health, county and state medical societies and specialty groups, public health groups, health councils, state departments of social welfare and of public instruction, hospitals, laboratories, clinics, private, parochial and public schools, dental colleges, universities, libraries, teachers, education departments and boards, pharmacists, dental supply houses, Parent-Teacher Association, Chamber of Commerce, Council on Social Agencies, National Dairy Council, civic and service groups such as American Legion, Lions Club, Rotary Club, Optimist Club, Kiwanis Club, Boy Scouts, Girl Scouts, Exchange Club and Junior League, transportation companies, boys' clubs, women's clubs, fraternal organizations, religious groups, department stores, gas and light companies, factories and banks.

A few examples of cooperation are given: the Bureau of Dental Health of the Department of Public Health of the State of New York offered special assistance to the state council on dental health by developing a kit of materials keyed to the problems in New York State. These education aids were intended for use by district councils on

Comparison of Children's Dental Health Day Activities

| Activity | Number of communities, 1949 | Number of communities, 1950 |
|---|---|---|
| Proclamation by governor | 13 | 26 |
| Proclamation by mayor | 33 | 93 |
| Scientific meetings | 38 | 65 |
| Lay meetings | 34 | 102 |
| Newspaper releases | 76 | 187 |
| Radio programs | 70 | 162 |
| Poster contests | 20 | 67 |
| School programs | 38 | 155 |
| Exhibits | 24 | 65 |
| Demonstrations | 17 | 35 |

dental health and other interested groups.

In Coshocton, Ohio, the Sorosis Club was active in the promotion of Children's Dental Health Day, especially in the schools. This club has inaugurated the use of a number of dental education aids in the schools, such as toothbrushing sheets, Mickey Mouse certificates, chart on "How to Brush Your Teeth," dental health booklets and badges.

The report from Albany, Ore., made special mention of the cooperation of school instructors and the integration of dental health education in the regular school curriculum. Likewise, reports from Missouri emphasized school programs and the cooperation of personnel. The St. Louis Dental Society prepared a leaflet giving the rules of dental health. School superintendents and principals aided in distributing 160,000 of these pamphlets to students. Many of the reports with regard to essay, poster and slogan contests give high praise to instructors of art and English, without whose guidance these education programs could not have been conducted.

From Mississippi, the report from the dental hygienists of the State Board of Health is detailed with regard to activities in the various counties. Information is given with regard to inspections, corrections, prophylaxis, talks, sodium fluoride demonstrations and other activities on Children's Dental Health Day.

### MEETINGS

Meetings for the laity and the dental profession were designed to acquaint the public with the value of dental care and the profession with the latest scientific advances in the field of dentistry for children. Owing to lack of space, only a few of the meetings can be mentioned here.

On November 16, 1949, a seminar on dentistry for children was held at Marquette University Medical School Auditorium, Milwaukee, for the purpose of establishing an annual Children's Dental Health Day in Milwaukee County. This meeting was under the auspices of Marquette University School of Dentistry, Marquette Dental Alumni Association and Milwaukee County Dental Society. Other areas in Wisconsin reported extensive celebrations on February 6.

In Connecticut, the scientific meeting and banquet in Hartford was attended by more than 200 dentists, their wives and hygienists. The guests were the mayor, superintendent of schools, president-elect of the medical society, health officer, heads of the P.T.A. and the first selectmen of the surrounding towns. The speaker of the evening was Allen G. Brodie, dean of the College of Dentistry, University of Illinois. In January, the Hartford Dental Society also distributed 25,000 stamps to members of the society to be placed on correspondence. In Bridgeport, where a letter writing contest on the subject of sodium fluoride was conducted in the schools, prizes were awarded publicly by Mayor Jasper McLevy. There were 400 in attendance at this lay meeting.

Maury Massler, professor of graduate pedodontics, College of Dentistry, University of Illinois, talked on "Oral Habits in Children: Significance and Management" at the scientific meeting of the District of Columbia Dental Society. Approximately 225 dentists were in attendance.

Three areas in the Territory of Hawaii (the cities of Honolulu and Wailuku and the county of Kauai) reported this year on the observance of Children's Dental Health Day. In Honolulu, two meetings were held, which were attended by approximately 1,500 persons.

The California State Dental Association held a Children's Dental Health Conference. Approximately 450 dentists heard outstanding essayists and clinicians discuss many phases of dental care for children. The association also placed speakers before 15 civic organizations

during the week of February 6 and distributed 800 car cards and 50,000 leaflets.

In Detroit, which city on January 30 celebrated Children's Dental Health Day for the third time, a scientific meeting with an attendance of 320 was held. The address and clinics presented by prominent speakers dealt primarily with the child patient.

The Cleveland Dental Society, which has celebrated Children's Dental Health Day for ten years, again had an elaborate program. An outstanding event was the lay meeting, which was attended by 5,000 persons. Featured on the program were a "Dental I.Q. Radio Quiz," a "Tooth and Consequence Game," motion pictures, prizes, music, drawing for a television set and the presentation of free toothbrushes. A scientific meeting of the Cleveland Dental Society, with 700 in attendance, also was held. Other Ohio cities that celebrated Children's Dental Health Day were Cincinnati, Youngstown, Coshocton, Akron, Kent and Ravenna.

As a climax of an enthusiastic observance of Children's Dental Health Day, the Omaha District Dental Society had a dinner and scientific session at Children's Memorial Hospital. Speakers were Lynn Thompson on "General Anesthesia for Children's Dentistry"; E. L. Lampshire on "Modern Trend in Dentistry for Children," and J. L. Gedgoud on "Relationship Between Physician and Dentist."

Some of the other areas which held large scientific or lay meetings are Passaic County, New Jersey; Norwich, Connecticut; Price and Helper, Utah; Chicago; New York; Philadelphia; Cincinnati; St. Louis and Los Angeles.

### NEWSPAPERS, RADIO

The value of the recognition by newspapers and radio stations of the importance of dental health for children cannot be measured. Numerous areas have given high praise to newspapers and radio stations for their cooperation. The Dental Society of the State of New York reported 411 radio spot announcements, interviews or talks, with 346 articles in the press. A number of the radio programs were network shows.

The Minnesota State Dental Society this year stressed the effectiveness of the women's auxiliary in the observance and also its excellent newspaper, radio and television coverage. Both the daily and weekly press cooperated fully. The thought was expressed that having separate programs on more than thirty radio stations was more effective than a statewide broadcast because of the local interest injected.

G. A. Bunch, director, Division of Dental Health, State Board of Health, reported, among other activities, an impressive schedule of radio broadcasts in South Carolina. During February and March, 57 dental programs were broadcast over many stations.

In Alaska, attention was directed to Children's Dental Health Day by an article in "Alaska's Health," by H. E. Pope, chief, Dental Health Unit, Alaska Department of Health. The following is an excerpt from his comments:

> The Alaska Department of Health has taken the initial step . . . by instituting a dental care program which has forged forward the past two years and accomplished considerable in overcoming the problems encountered in bringing dental care to the children of outlying communities. . . . The next few years are going to show tremendous advances forward in plans for preventive dental care for children all over the country. . . .
>
> Let us hear from the people on the sixth of February, 1950—the first Children's Dental Health Day in Alaska!

### TELEVISION

In 1949, only the District of Columbia Dental Society, the Ninth District Dental Society of Tennessee, Cleveland and Buffalo reported the use of television. This

year television programs were reported in sixteen areas, as follows: Pittsburgh and Philadelphia; Buffalo, Rochester and New York, New York; Huntington, West Virginia; Cleveland; Los Angeles; San Francisco; Washington, D. C.; Chicago; Baltimore; Detroit; Minneapolis; St. Louis and Omaha.

In the program entitled "Creighton University Presents," L. W. Teutsch, director of the Department of Children's Dentistry, was featured in a telecast entitled "Dental Health for Tiny Tots." This program, which was sponsored by the Omaha District Dental Society, dealt with the value of sodium fluoride treatment for children and stressed the necessity of eliminating the element of fear from the child's first visit to the dentist.

### ROENTGENOGRAPHIC EXAMINATIONS

Free bitewing roentgenographic examinations, which are becoming increasingly popular as a means of dental health education, were used on Children's Dental Health Day in 36 areas. This device has a twofold purpose in that it is a means both of education and of detection of disease.

Nine New York department stores in five boroughs offered free bitewing examinations to all children between the ages of 5 and 16 who were accompanied by a parent or guardian. This "Bitewing X-ray Project," which was sponsored by the Department of Health, had been suggested by the Women's Dental Society. The developed films were mailed to the parents, with instructions to take them to the family dentist for interpretation and advice. The staff comprised 225 dentists and 140 assistants. The number of children examined was 8,533. The Dental Society of the State of New York reported that 23 communities in the state had had bitewing x-ray projects.

The Bronx County Dental Society observed Bronx Dental Health Day on April 13. Among the features on the program were free roentgenographic examinations for children, a panel on adequate dentistry for children of low income groups and lecture demonstrations on prevention of dental caries, the care of children's teeth, psychologic factors in dentistry and modern concepts of dental care.

### IMMEDIATE BENEFITS

Although the long range benefits of the observance of Children's Dental Health Day in terms of education cannot be measured readily, certain immediate benefits are apparent.

In Eugene, Ore., an education program to first and second graders was begun, with distribution of the pamphlet entitled "The Care of Children's Teeth: Questions and Answers." Plans also were made to start a dental clinic for indigent children.

In Waterbury, Conn., an education film library was started, with donation by the local dental society of motion pictures to the schools. The film "It's Your Health" was donated this year.

In Kansas, six counties which previously had not participated in the school dental health program instituted programs. The school dental health program now operates in every county. Children's Dental Health Day was utilized by the Shawnee County Dental Society and the Topeka Public Schools for launching a bitewing x-ray demonstration program. All children in the public elementary school system who had not returned to their teachers their school dental health cards indicating completion of needed dental corrections were given bitewing examinations. The undeveloped films were given to the child with the request that he take them to his dentist for developing and interpreting. The effectiveness of this follow up procedure was demonstrated by the fact that within ten days, 31 per cent of the 1,814 children who had roentgenographic examinations

had made appointments with their dentists.

S. H. Isserlis, president of the Fall River Dental Society, addressed the high school student body in Fall River, Mass. The title of his talk was "Teeth, Health and Appearance." Other dentists also appeared on school programs in honor of Children's Dental Health Day. As the result of this dental health education effort, plans are being made for a dental program in the schools.

The dentists in Corpus Christi, Tex., have recommended the employment of two dental hygienists in the schools. This recommendation plus the interest stimulated by the observance of Children's Dental Health Day promises to result in an improved dental health program for the coming year.

Although perhaps not necessarily a direct result of the observance of Children's Dental Health Day, a resolution adopted by the executive committee of the New Hampshire Dental Society is of interest. This resolution, which will be presented to the Board of Education, would prohibit the sale of candy and soft drinks in the schools.

In Wyoming, the Casper Dental Society took advantage of Children's Dental Health Day by inaugurating a long range program aimed at the early correction of defects in the mouths of children in the rural and parochial schools of Casper, Midwest and Natrona counties. The society's program is of utmost significance in Wyoming because it is the first organized city program of dental public health in the state.

From Santa Fe, N. Mex., it was reported that two clinics for dental treatment are operated. An effort now is being made to develop a program for dental examinations for all children.

### OTHER ACTIVITIES

In southern California the two objectives in the observance of Children's Dental Health Day were to stimulate the interest of members and obtain their individual participation and to obtain public recognition of the day. The Association distributed 7,000 copies of the leaflet, "Your Child's Teeth," and 3,000 copies of the leaflet, "Sugar Bowl Pete." This Association also prepared a radio transcription entitled "The Story of Evangeline Jordan." A placard was designed for the offices of members announcing "This day devoted exclusively to your child." This project was underwritten by the California Dental Supply Company. The Southern California unit of the American Society of Dentistry for Children arranged a commemoration dinner, which had an attendance of about 200.

In Illinois, where an elaborate program was conducted in many cities, the motion picture "It's Your Health" was shown to more than 6,000 students in the public schools of Rockford under the sponsorship of the Winnebago County Dental Society. A dentist was present at each showing of the film. There were more than 200 entries in the school poster contest, the theme of which was "Teeth and Their Care."

Leon R. Kramer, director, Division of Dental Hygiene, Kansas State Board of Health, who represented the American Dental Association at the fifth National Conference on Rural Health on February 3 and 4, placed a Children's Dental Health Day exhibit in the lobby of the Kansas City Municipal Auditorium and distributed copies of "A Dental Health Program for the Community, State and Nation."

Gaily colored toothbrushes were presented to children attending special exhibits in two stores in Springfield, Massachusetts. Roentgenographic examinations were made, and after toothbrush drills, the children were given toothbrushes. The Valley District Dental Society, in whose area Springfield is located, submitted to the Central Office an im-

pressive scrapbook showing Children's Dental Health Day activities.

On the questionnaire returned from Greater New York (First, Second and Tenth District Dental Societies), the answer to the question concerning special school programs was "too many to be counted." A further comment was that the cooperation of the Board of Education and Department of Health helped produce "the greatest concentration of 100 per cent completion dental slips" and "an equally large number of banners awarded for 100 per cent completion classes."

In Pennsylvania, the Warren County Dental Society aroused considerable interest by sponsoring a crossword puzzle entitled "Can You Fill This Tooth?" The puzzle, which uses many dental terms, is contained within the outline of a molar. The *Pennsylvania Dental Journal* has published in its April and March issues a detailed report by districts of Children's Dental Health Day activities.

Rhode Island, which celebrated Children's Dental Health Day for the first time this year, had a successful program. It consisted of the distribution of the pamphlet "The Care of Children's Teeth: Questions and Answers" and posters, radio participation by prominent dentists, school programs, motion picture programs and newspaper releases.

In Springfield, Tenn., a dental clinic was opened officially on February 3, with special attention to children on February 6. In Knoxville, the Knoxville City Dental Clinic was opened on February 6. Approximately 300 citizens attended this opening. It is estimated that more than half a million people in Tennessee heard something about children's dental health during observance of the day.

### FUTURE PLANNING

By direction of the House of Delegates, the Council on Dental Health is making a poll of local and state societies to establish the date in 1951 for the observance of Children's Dental Health Day.

The suggestion has come from many areas that the observance be a Children's Dental Health Week instead of a Children's Dental Health Day. This year several areas celebrated a Children's Dental Health Week; for example, the California State Dental Association; First, Second and Tenth District Dental Societies of New York; Fifth and Sixth Districts of Pennsylvania, and the Akron Dental Society.

In response to the inquiry to chairmen, a number of suggestions for future Children's Dental Health Day programs were received. Next year's planning will require a further appraisal of the results obtained both in immediate benefits and in education with regard to the contributions of dental health to the child's general health, appearance and personality.

COUNCIL ON DENTAL EDUCATION

# The dental aptitude testing program

The Council on Dental Education and its Committee on Aptitude Testing on February 1 and 2 discussed the plans that have been developed for conducting the nationwide Dental Aptitude Testing Program. The Council on Dental Education was authorized to establish an experimental aptitude testing program which began in the fall of 1946. The program has continued since that time with all of the accredited dental schools cooperating in the venture. During this period of experimentation the Council and its Committee have found that aptitude test scores are useful when used with other available data in predicting dental school success.

The aptitude tests have been given since 1946 only to the students who have been admitted as freshmen, and their progress in dental schools has been studied with a view toward determining what facts and measurable skills are useful in predicting the success of a student in dental school. The ability of the test scores to predict the letter grades of the students in any one class depends not only upon the tests that are used, but also upon the spread or range of the students' test scores as well as upon the range or variability of the letter grades that are given. In one school in which the students' test scores had considerable range and in which the letter grades given to the students had a sufficient amount of spread, it was possible by using scores from three of the tests in the aptitude test battery, to predict 58 per cent of the students' freshman grades in the academic type subjects with an accuracy of one-fourth of a grade point, to predict 88 per cent of the students' grades with an accuracy of one-half of a grade point, and to predict all the freshman grades with an accuracy of one grade point. The accuracy of prediction becomes even greater when other factors, such as the students' predental grades, are employed. In the school whose data are given above the freshman grades in preclinical work could not be predicted quite as accurately, but this is partly due to the fact that in the freshman year there is relatively little preclinical work given.

The results of the aptitude testing program during the past years have aroused a great deal of interest among the admissions committees of the dental schools. Forty dental schools, as a result of their experience with the aptitude testing program, indicated their desire to cooperate in a program which will provide them with test data on all applicants. At the Annual Meeting of the American Dental Association held in October, 1949, in San Francisco, the Council on Dental Education was authorized to conduct a nationwide testing program. The wording of the resolution that was passed at that time is as follows:

> Whereas, it has always been the desire of the dental profession and the dental schools that the best qualified applicants be selected for admission to the dental schools in order to maintain a high level of competence among the graduates, and
>
> Whereas, it has been demonstrated through an experimental program that aptitude tests can be used effectively for selecting students who will succeed in dental school, and

**Whereas, the dental schools desire to cooperate in a program that would require tests to be taken by the applicants whom they will consider, therefore be it**

**Resolved, that the Council on Dental Education be authorized to place its Aptitude Testing Program on a nationwide basis so as to provide the dental schools with data on applicants, beginning with the class entering in the fall of 1951, this program to be supported financially by fees charged of the applicants tested.**

The nationwide Dental Aptitude Testing Program will be placed in operation in 1950 so that the schools may employ the aptitude test scores in the selection of their 1951 freshman classes.

Applicants for admission to dental schools for the fall of 1951 should send their applications directly to the dental school or dental schools in which they are interested. *No applications should be sent to the Council on Dental Education of the American Dental Association.* The applicant should conduct his correspondence with the dental school or dental schools of his choice and if a school, after reviewing all of his credentials, wishes to have him take the Dental Aptitude Test, the school will notify the Council on Dental Education. The Council on Dental Education will then send to the applicant an application form which he must fill out in detail. Having completed the application form and attached to it three pictures of himself, the applicant must return the form to the Council on Dental Education along with a fee of $10.00. The applicant will have an opportunity at this time to indicate the testing center at which he wishes to present himself for examination. Upon receipt of the completed forms, the Council on Dental Education will indicate to the applicant where he is to take the examination, and send to him a receipt for the testing fee. This receipt, to which is attached one of his photographs, will act as his identification and ticket of admission to the Dental Aptitude Test, for the photograph must correspond with the photograph attached to the form which has been sent to the test administrator at the testing center.

The reports on the student's aptitude test scores will be reported to those dental schools which have certified the student to take the examination. The school and its admissions committee will review and analyze the reported test scores and consider them along with all of the other information which they have been able to gather from the applicant and about the applicant. Therefore, the admissions committees will be considering in their deliberations not only aptitude test scores but also transcripts of grades from a student's previous college and university work, letters of recommendation, reports of committees that may have interviewed the applicant, high school records, and various other data that may have been collected upon application forms and from other sources. In other words, the aptitude test scores in themselves will never be the sole criterion upon which an applicant will be admitted to a dental school. In this aptitude testing program, as in other testing programs on a nationwide basis, there will be no attempt to send each applicant any record of his aptitude test scores. These scores and data are confidential information and will be made available only to the dental schools and their admissions committees. Should an applicant find himself rejected, he is urged to review again his own ability and the type of previous training which he has pursued, in order to determine to his own satisfaction whether he should continue planning on a career in dentistry or whether he should now consider making plans to enter a different profession or vocation. He is encouraged to consult with the counselors and guidance officers in the university or college which he is attending and apply for permission to be given

sets of aptitude tests which may reveal in what other occupations or professions he would be better suited and prepared.

If the applicant makes application to several schools, the Council on Dental Education may receive from more than one school authorization for a certain applicant to take the battery of tests. In any event, the applicant will be required to pay only a single fee in case he wishes his test records sent to no more than five schools. A special service charge will be made if reports need to be sent to more than five schools. No applicant will be allowed to take the test battery more than once during the school year.

At the time that the applicant sends his application form and photographs to the Council on Dental Education, he will have an opportunity to list in the order of his preference the three testing centers of his choice. He will be assigned, if possible, to the testing center of his first choice.

Following is a list of the dental schools that are cooperating in the American Dental Association Aptitude Testing Program and at which the Dental Aptitude Tests will be given. The cooperating dental schools have announced that they will request those applicants whom they will consider for admission to take the dental aptitude tests. Also accompanying the list of dental schools is a list of state universities and colleges in which testing centers for the American Dental Association Aptitude Testing program have been established. The creation of these centers enables more students to be tested in those areas from which a high percentage of the applications are received and also in those areas in which no dental schools are located.

COOPERATING DENTAL SCHOOLS

| | |
|---|---|
| Alabama | University of Alabama |
| California | College of Physicians and Surgeons |
| | University of California |
| | University of Southern California |
| District of Columbia | Georgetown University |
| | Howard University |
| Georgia | Emory University |
| Illinois | Loyola University |
| | Northwestern University |
| | University of Illinois |
| Indiana | Indiana University |
| Iowa | The State University of Iowa |
| Kentucky | University of Louisville |
| Louisiana | Loyola University |
| Maryland | University of Maryland |
| Massachusetts | Harvard School of Dental Medicine |
| | Tufts College |
| Michigan | University of Detroit |
| | University of Michigan |
| Minnesota | University of Minnesota |
| Missouri | The University of Kansas City |
| | St. Louis University |
| | Washington University |
| Nebraska | The Creighton University |
| | University of Nebraska |
| New York | New York University |
| | University of Buffalo |
| North Carolina | University of North Carolina |
| Ohio | The Ohio State University |
| | Western Reserve University |
| Oregon | University of Oregon |
| Pennsylvania | Temple University |
| | University of Pennsylvania |
| | University of Pittsburgh |
| Tennessee | Meharry Medical College |
| Texas | Baylor University |
| | University of Texas |
| Virginia | Medical College of Virginia |
| Washington | University of Washington |
| Wisconsin | Marquette University |

OTHER TESTING CENTERS

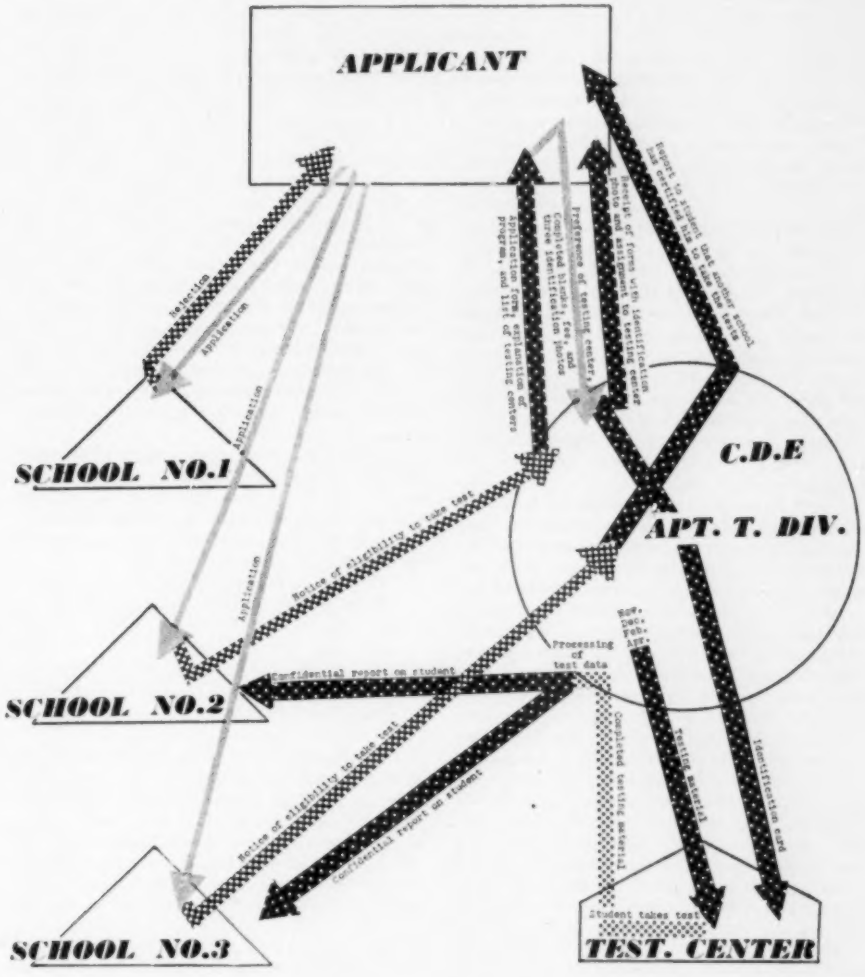
| | |
|---|---|
| Arizona | Arizona State College |
| Arkansas | University of Arkansas |
| Colorado | University of Colorado |
| Connecticut | University of Connecticut |
| Delaware | University of Delaware |
| Florida | University of Florida |
| Idaho | University of Idaho |
| Illinois | University of Illinois |
| Indiana | University of Indiana, Adult Education Center |
| Kansas | Kansas State College |
| Maine | University of Maine |
| Mississippi | University of Mississippi |
| Montana | Montana State College |
| Nevada | University of Nevada |
| New Hampshire | University of New Hampshire |
| New Jersey | Princeton University |
| | The State University of N. J. |
| New Mexico | University of New Mexico |
| New York | Brooklyn College |
| | The City College |
| | Queens College |
| North Dakota | University of North Dakota |
| Oklahoma | University of Oklahoma |
| South Carolina | University of South Carolina |
| South Dakota | South Dakota State College |
| Tennessee | Vanderbilt University |
| Texas | Texas Technological College |
| Utah | University of Utah |
| Vermont | University of Vermont |
| West Virginia | West Virginia University |
| Wyoming | The University of Wyoming |
| Alaska | University of Alaska |
| Hawaii | University of Hawaii |
| Puerto Rico | University of Puerto Rico |

Posters announcing the Dental Aptitude Testing Program and instructing the prospective dental applicant in the procedures he must follow in order to make application to take the test are now being mailed to approximately 1400 liberal arts colleges and universities, and junior colleges. Brochures designed to acquaint the prospective applicant with the Dental Aptitude Testing Program are now being prepared. These will be sent to the dental schools so that the schools may distribute them to the students making inquiries about the program. This brochure will contain an explanation of the aptitude testing program, a list of the dental schools that are cooperating, a list of testing centers, and sets of sample test questions so that the applicant may acquaint himself with the type of examination he will be required to take. A flow chart, a copy of which is duplicated here, is being sent to all dental deans, admissions committees, and testing centers to acquaint them with the plan of the program.

The Council on Education's Committee on Dental Aptitude Testing consists of five members of the Council who are: O. W. Brandhorst, Roy O. Elam, J. Ben Robinson, Henry M. Willitts, and R. W. McNulty (ex-officio); and five members who comprise the Dental Aptitude Testing Committee of the American Association of Dental Schools who are: A. Raymond Baralt, William E. Hahn, Clarence M. Peebles, Ray V. Smith, and Wendell L. Wylie. O. W. Brandhorst is Chairman of the Council's Committee, and Ray V. Smith is Chairman of the Committee of the American Association of Dental Schools. Shailer Peterson, Secretary of the Council on Dental Education and formerly Director of Educational Measurements for the Council, is an ex-officio member of the Council's Committee and is directing the development of this aptitude testing program.

The Council on Dental Education has, with the approval of the Board of Trustees, named a group of consultants who will help in the planning and design of

FLOW CHART OF STUDENT APPLICATIONS AND TEST MATERIAL
IN THE DENTAL APTITUDE TESTING PROGRAM




Revised March 31, 1950

the program as well as others who will assist in the construction and evaluation of some of the tests themselves. Among the list of consultants are specialists in the field of tests and measurements such as Palmer O. Johnson, University of Minnesota; Ralph W. Tyler, University of Chicago; Max D. Engelhart, the Chicago City Junior Colleges, and Everet F. Lindquist of the University of Iowa. Other consultants who have been named will be reported later.

# *The Reader Comments*

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editors reserve the right to edit all communications to fit available space and require that all letters be signed. Signatures will be deleted before publication at the request of the author. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

*The Editor*

## A REPLY TO DR. KNIESNER

It is unfortunate that Albert H. Kniesner in his paper, "A Critical Review of the Newer Methods Proposed for the Reduction of Dental Caries" (J.A.D.A. 40:134, Feb. 1950) based his conclusion on an abstract of our paper. Had he read the paper as published in full ("Caries Incidence Reduction by Unsupervised Use of 27.5 Per Cent Ammonium Therapy Dentifrice," J. D. Res. 28:248, June, 1949) he might have altered his discussion.

The full article as published contains the complete formula for the dentifrice; the abstract did not. It was not necessary for Dr. Kniesner to depend on "full page advertisements"; the latter are apt to be misleading.

The full article as published deals primarily with 150 test cases and controls. The caries reduction of the test cases in three years of use of the "high-urea" formula has been shown to be statistically significant. In addition, 40 children and 30 cases of complete mouth rehabilitation were included, for which no controls were presented. The figures for these latter were included because they were part of the study, but with no controls. We did not feel justified in drawing conclusions from them. In fact, because of the extremely low caries rate of the latter group, it "was not incorporated into the test group of 100 since for obvious reasons it would have unduly influenced the final figure."

Dr. Kniesner's conclusion that "complete restoration of existent lesions had almost accomplished as much caries control as had the action of the ammonium dentifrice itself" is unwarranted from the data presented because: (1) no comparable control group was given against which a comparison could validly be made, and (2) all the other groups had also undergone consistent and complete restoration of existent lesions. Hence the factor of operative interference was equal in all groups.

The common denominator for all the groups is the fact that they had ". . . presented themselves regularly for examination and treatment over a sufficiently long period of time for the purposes of this study. . . ." The conclusion that is warranted, therefore, is that good, timely operative dentistry, coupled with the use of the ammoniated dentifrice, was more efficacious in controlling dental caries in these cases than the operative dentistry alone.

Also, the controls brushed their teeth with cosmetic dentifrices. Therefore, the ammoniated ingredients were shown to be 35.2 to 41.9 per cent more effective in reducing dental caries in the cases reported than the use of the cosmetic dentifrices alone.

*Chester J. Henschel, D.D.S.*
*Leon Lieber, D.M.D.*

## UNIFORM DENTAL NOMENCLATURE

I was delighted to see the reports from the Bureau of Library and Indexing in the January issue telling about the beginning of the work of developing more uniform nomenclature for dentistry. The statement of authorization and the general principles adopted for this task arouse hope that much will be accomplished. The staff has my best wishes for success.

The nine headings indicating the various aspects of dentistry under which the examination of terms will proceed are indeed logical. I hope that under the first heading, "Anatomy," consideration will be given to the various terms used by dentists to generalize or group the anatomical structures that are the main concern of dentistry.

In current literature one finds a curious assortment of terms, such as "the masticatory mechanism," "the masticatory apparatus,"

"the dental mill," "the teeth, jaws and face," "the dento-facial complex," "the facio-dental complex" and "the masticatory areas." Obviously, there is need for a convenient collective term to designate the "teeth, oral cavity and associated parts" (Dorland's *American Illustrated Medical Dictionary*), the parts of the body that are the responsibility of dentists. The best collective name for these parts that I am able to suggest is "the masticatory system."

There is nothing unusual about the words "masticatory system." It is widely accepted to use the word "system" to designate "a set or series of parts or organs which unite in a common function" (Dorland's *American Illustrated Medical Dictionary*). Yet I do not recall ever seeing or hearing anyone use the term "masticatory system." It appears that many authors prefer to use "mechanism" or "apparatus," words that have a machine-like connotation that seems unsuitable for application to portions of a vital organism.

True, the word "masticatory" is a bit difficult to say rapidly, especially if one's mouth is dry. Neither is it a "quickie"; but none of our dental terms meet our American speech standards as perfectly as do our favorite sounds; "O.K."

*Thomas D. Speidel, Minneapolis*

## A LAYMAN SPEAKS

Like religion, medicine and dentistry should be kept out of politics, and if you will note through the course of history, the meddling of religious groups in exerting pressure upon medical men, it has been due to their consistent prying that medical research has been thwarted and retarded.

Since when has it been compulsory for me as an American citizen to have deducted from my salary, any sum, no matter how trivial, for something I neither want, approve of, and utterly abhor? The coffers of the government are now being filled with enough taxes—hidden, direct, and indirect ones, than to have the ultimate gall to demand that the very people forsake the strength of our country.

Wherever the government has entered, in business, finances, in the operation of anything, it has been a failure—to be finally thrust upon the people in some manner of taxation. Personally, I have had four major operations; one of a serious nature, in a city-owned hospital, and I can vouch for the inefficient and lack of individual personal care.

Something that comes cheap is never all that it is supposed to be. I want no intervention, no dossiers on my personal life to be strewn about some government office. When I speak to my physician or dentist I do not want it recorded for time, for the collection of a fee by a governmental agency, or, to be more specific, a government that is no longer interested in anything but the continual taxation of its people.

On the other hand, today more than ever, through many private organizations, people are receiving better and more efficient medical care than ever before. It is neither compulsory nor demanding, for a sum that can usually be met by the lowest class worker—available to all those who wish, voluntarily, to join.

There is a bitter taste and an individual resentment in the fact that gradually, little by little, the government is foisting upon the people more taxation. The initiative, the incentive to invest is slowly being deadened. Why? Because of the government's continual policy of devising more taxes and adding more confusion to an already chaotic situation.

For seventy-five cents a week, a mere trifling sum, the skies shall open, and we shall be bombarded with all medical and dental care—all expenses defrayed by our government. Yes, for seventy-five cents for one program, so much for another, gradually the take-home pay becomes smaller and smaller. I am in favor of nothing that is passed upon without the consent of the people at large. There is no need to quote to us of other countries. Anyone that can read knows we have the highest standard of living in the world. Do not convey to us, or, in this case, me, what other countries are doing. In many cases, anything that other governments do for their citizens should have been done for their good ages ago. There should be no need of comparison.

Plainly and clearly understandable, the infiltration that is being perpetrated against the American people as a whole, against the business man—big or little, is the government's war against the very essence of our supposedly free way of life.

I am definitely against bills No. S. 5 and H.R. 783 (sounds like some sort of numerical and alphabetical soup), and once again, I am infuriated to think that there are men, supposedly elected to defend the rights of the people against such governmental meddling, while it would seem that they have no more interest than in paving their own personal way at the expense of others.

*William J. Wadsworth, Myrtle Beach, S. C.*

# *Current Literature*

## TOXICITY OF LOCAL ANESTHETICS

*John D. Walters, Cmdr., (M.C.), U.S.N. U. S. Naval Medical Bulletin, 48:871. November-December, 1949.*

This paper reviews the literature concerning the untoward reactions that may result from the use of local anesthetics, the precautions for prevention of these reactions and the treatment.

Toxic reactions to local anesthetics are more common than ordinarily supposed. Their increased use within the past years from one per day to four per day would logically increase the number of reactions. In 1946, Corlette, of Australia, found that the incidence of mortality from spinal anesthesia was three times as great as that of chloroform of fifty years ago. Spinal anesthesia presents the highest mortality incidence with intravenous ranking next.

Adriani, of New Orleans, places local anesthetics into three groups. The first is composed of complex esters, with one or more atoms of nitrogen in the molecule. The majority of the drugs in common use are in this group: procaine is an example. The second group, phenolic and alcoholic compounds, includes phenol, menthol, benzyl alcohol and is principally used for surface anesthesia. The third group is composed of complex compounds containing nitrogen and similar to the ester type of drug in pharmacologic and physical behavior, though different structurally. Examples are eucupine, halocaine, nupercaine and quinine. The most important of local anesthetics are the ones derived from para-aminobenzoic acid.

There are two types of toxicity (Adriani): general systemic toxicity, when the anesthetic gets into the blood stream and local, tissue toxicity. Since the action of most local anesthetics is reversible, the cells affected regain their normal function once the drug is absorbed or washed away.

There are two types of reaction: idiosyncrasy or immediate reaction (considered allergic), following injection or application of small amounts. Syncope and signs of circulatory and respiratory failure follow immediately. Death is attributed to cardiac failure. Secondly is the reaction, or delayed reaction, due to overdosage, which is the most common type and gives a better prognosis. Stimulation, excitement or vomiting, may be followed by convulsions, depression and paralysis of the central nervous system.

A few precautions may minimize the reactions. Insure a high intake of dextrose and vitamin C to the debilitated and poor risk patient. Inquire into the history of sensitivity to the drug. Administer barbiturates. Use least toxic drug. Use smallest amount and weakest concentration permitted. Aspirate before injecting. Use epinephrine in the solution when infiltrating highly vascular areas.

Treatment consisted of (1) artificial respiration and oxygen to those who have stopped breathing; (2) intravenous sodium pentobarbital or amytal for convulsions; (3) epinephrine, administered slowly in saline infusion for impending cardiac failure; (4) direct massage of the heart for cardiac arrest, and (5) withdrawal of spinal fluid in spinal anesthesia.

*C. Weil*

## PROPHYLACTIC ORTHODONTICS

*F. N. Weber. American Journal of Orthodontics, 35:611. August, 1949.*

This article is in itself a summary of the principles and procedures which the author feels are useful in avoiding or minimizing developing malocclusion. Therefore, it is difficult adequately to abstract this all-inclusive summary.

The author quite properly places emphasis upon the need for an adequate diagnosis as a basis for treatment planning and treatment. The phases of treatment which are discussed are: (1) exercising great care in restoring the occlusal and proximal aspects of the primary and permanent teeth; (2) extracting primary teeth at the correct time; (3) trimming the primary molars when necessary; (4) where indicated, the use of tongue depressor blades for correcting incisor crossbites; (5) the use of brass ligature separating wire to release permanent posterior teeth from impacted positions; (6) careful consideration of the probable results of extracting primary or permanent teeth before recommending their removal; (7) extraction of supernumerary teeth whenever and wherever found; (8) surgically exposing the crowns of those permanent teeth that are retarded in their eruption; (9) breaking oral habits at the earliest possible time; (10) the use of space-maintaining devices following the premature loss of primary teeth when ob-

servation shows a tendency for the space to close beyond safe limits.

*T. D. Speidel*

## BLOOD LOSS IN INFANT CLEFT LIP AND CLEFT PALATE SURGERY

*Reed O. Dingman, O. Lee Ricker and Vivian Iob. Plastic and Reconstructive Surgery, 4:333. July, 1949.*

Since blood loss during surgical procedures can delay the general recovery of the patient, delay the healing of the operative site, and if severe predispose the patient to shock, the authors of this article showed the value of infiltrating a local anesthetic with a vasoconstrictor component into the operative area to reduce the blood loss.

A series of surgical cases for repair of congenital cleft lips and cleft palates was used for study. The patients were all good surgical risks varying in age from 22 days to 84 months.

In some cases, 1.5 per cent procaine with 1:285,000 epinephrine was used, while in the control group no local anesthetic with a vasoconstrictor was employed. The hemorrhage control was the same for each operation and consisted of the following: (1) digital pressure; (2) Blair lip clamps; (3) hemostats applied to evident bleeders and (4) use of epinephrine-soaked gauze packs as indicated.

The blood loss during each operation was determined by placing all soiled sponges in distilled water and saving all suction fluid and washings from instruments. A sterile waterproof draw sheet was used to eliminate blood-soiled linen. The hemoglobin of the total washings was converted to oxyhemoglobin after proper dilution and read in a photoelectric colorimeter.

The results of this study indicated that in all cases the use of procaine with 1:285,000 epinephrine significantly reduced the blood loss. In the unilateral incomplete cleft lip repairs, for example, the average percentage of total blood loss dropped from 7.3 per cent to 2.7 per cent when procaine and epinephrine were used. In the second stage of the cleft palate operations, the reduction was from 6.5 per cent to 3.7 per cent. Other stages of cleft palate repair and types of cleft lip operations showed smaller but still significant reductions of blood loss.

In all cases recovery was uncomplicated and no postoperative shock occurred, but the blood loss in bilateral cleft lip surgery without a vasoconstrictor infiltrated locally did approach shock levels.

Since 1:285,000 epinephrine in 1.5 per cent procaine apparently gave reduction in blood loss and reduced the amount of general anesthesia necessary to perform the operations, the authors suggested that higher concentrations of epinephrine, 1:75,000 for example, should give greater hemostasis.

*M. R. Holland*

## THE EFFECT OF TOPICALLY APPLIED FLUORIDES ON DENTAL CARIES EXPERIENCE

*John W. Knutson and Grace C. Scholz. Public Health Reports, 64:1403. November, 11, 1949.*

This article summarizes the results of four previously reported studies of the effectiveness of topically applied fluorides on dental caries experience in the permanent teeth of children and also combines the four studies in an analysis by individual teeth and by classes of teeth.

Each of the four studies was of children 7 to 15 years of age, and each included between 200 and 300 children. The method employed was to treat one side of the mouth and leave one side untreated as a control. Examination was made after one year and the examiners were not told which side of the mouths had been treated.

All of these studies reported between 38.7 and 41.7 per cent fewer newly carious teeth in treated mouth halves, with a total reduction of 40.3 per cent for the entire group of 1,032 children. For upper teeth the over-all reduction was 42.3 per cent, and for lower teeth it was 37.4 per cent.

The incidence of caries in two pairs of upper teeth (central incisor and cuspid) and in three pairs of lower teeth (central and lateral incisors and cuspid) was relatively low, and the number of children observed was not sufficient to determine that the reduction was more than could occur by chance. In all other teeth the reduction in new caries incidence was statistically significant at the 2.27 per cent level.

In upper teeth, the reduction in distal surface decay was 45.1 per cent, in occlusal surface decay 42.4 per cent, and in mesial surface decay 41.0 per cent. For lower teeth, statistically significant reductions in new caries incidence were found for occlusal surfaces (37.9 per cent) and for buccal and labial surfaces (50.0 per cent). Little or no reduction was noted for the mesial or distal surfaces of lower teeth. This latter finding is noteworthy since it may indicate a failure to wet these surfaces properly with the technic employed.

*B. Duane Moen*

## JOURNAL OF DENTAL RESEARCH

*February, 1950*

Titles marked with an asterisk are reviewed below.

*THE EFFECT OF TOPICAL APPLICATIONS OF FLUORIDES ON DENTAL CARIES IN YOUNG ADULTS.
Egil Klinkenberg and B. G. Bibby, Boston.—4

*A SELECTIVE MEDIUM FOR LACTOBACILLI COUNTS FROM SALIVA.
Ben Elkan Diamond, with the technical assistance of Audrey Walstad, Pierre, S. D.—8

*A ROLE OF GLUCOSE IN THE PRODUCTION OF ARTIFICIAL CARIES.
David Weisberger, Boston.—14

*STUDIES ON THE EFFECT OF DL-GLYCERIC ALDEHYDE ON THE DENTAL CARIES ACTIVITY IN WHITE RATS AND COTTON RATS.
James H. Shaw, Boston.—23

*THE USE OF RADIOACTIVE PHOSPHORUS IN THE STUDY OF THE TEETH AND CARIES-RESISTANT AND CARIES-SUSCEPTIBLE STRAINS OF ALBINO RATS.
Carl A. Hoppert and Ray L. Shirley, East Lansing, Mich.—29

*THE AMMONIA CONTENT OF THE MOUTH.
W. E. Ludwick and L. S. Fosdick, Chicago.—38

*THE OCCURRENCE OF BETA HEMOLYTIC STREPTOCOCCI ON THE GINGIVA OF NORMAL YOUNG ADULTS.
Maury Massler and John B. MacDonald, Chicago.—43

*CHEMICAL STUDIES IN PERIODONTAL DISEASE. VI. THE GLYCOGEN CONTENT OF GINGIVAL TISSUE IN ALLOXAN DIABETES.
B. Cohen and L. S. Fosdick, Chicago.—48

*CHEMICAL STUDIES IN PERIODONTAL DISEASE. VIII. GINGIVAL GLYCOGEN CONCENTRATION IN EXPERIMENTAL OCCLUSAL TRAUMA.
C. A. Ostrom, W. G. Skillen and L. S. Fosdick, Chicago.—55

*THE EFFECT OF CERTAIN LUBRICATING AGENTS AND COARSE FOODS UPON THE CORNIFICATION OF THE ORAL MUCOSA OF THE WHITE RAT.
Abraham Perlman, New York.—59

A DIETARY ASPECT OF CALCULUS.
B. F. Gurney and John H. Huschart, Chicago.—63

*THE TOOTH PULP AS AN ALGESIMETRY SITE.
Stanley C. Harris and Norma E. Brandel. Chicago.—68

*HYPOPROTEINEMIA IN RELATION TO THE DENTAL TISSUES.
H. A. Hunter, Toronto, Ontario.—73

*THE SILVER IMPREGNATION METHOD APPLIED TO THE DENTIN MATRIX OF RACHITIC RATS AND TO THAT OF RATS WITH HEALING RICKETS.
J. T. Irving, Cape Town, South Africa.—87

*DISTRIBUTION OF RADIOACTIVE GALLIUM IN THE TEETH AND JAWS OF EXPERIMENTAL ANIMALS.
James A. English and H. C. Dudley, Bethesda, Md.—93

*THE RELATIONSHIP BETWEEN PHYSICAL CHARACTERISTICS OF THE DIET AND THE WATER CONTENT OF MONKEY TEETH.
N. A. Di Salvo and H. H. Neumann, New York.—101

### THE EFFECT OF TOPICAL APPLICATIONS OF FLUORIDES ON DENTAL CARIES IN YOUNG ADULTS

*Egil Klinkenberg and B. G. Bibby.*

At approximately three monthly intervals single quadrants of the teeth of 139 students, age 18 to 40 years, were treated with solutions of 1.0 per cent sodium fluoride and of 0.06 per cent lead fluoride.

After approximately 14 months, the quadrants treated with sodium fluoride showed 44.5 per cent less new DMF surfaces, or 56.6 per cent less new carious surfaces, than did the untreated control quadrants on the opposite sides of the mouths.

The quadrants treated with lead fluoride showed 27.5 per cent less new DMF surfaces, or 38.5 per cent less new carious surfaces, than their control quadrants.

### A SELECTIVE MEDIUM FOR LACTOBACILLI COUNTS FROM SALIVA

*Ben E. Diamond and Audrey Walstad.*

To Hadley's tomato juice agar is added 1:10,000 of 1.0 per cent sodium azide (practical grade, Eastman Kodak). This offers a selective medium with no inhibition of oral lactobacilli and excellent suppression of yeasts, molds, micrococci, streptococci, and other contaminants which confuse the counts from the tomato juice medium alone.

### A ROLE OF GLUCOSE IN THE PRODUCTION OF ARTIFICIAL CARIES

*David Weisberger.*

Artificial caries can be produced in human intact teeth as the result of the activity of mixed oral flora in nutrient media, consisting for the most part of known chemical substances in-

cluding glucose. The presence of glucose not only furnishes a medium by which the pH is lowered by acid formation, but also appears to be essential for the development of a pigmented carious process in which surface continuity is maintained.

Chemical determinations were made during incubation. Of the various chemical determinations made the change in a-amino acids seemed of particular interest. It was noted that, when glucose was present or when the medium was buffered at a pH of 4.0 without glucose, there was inhibition of deamination of the a-amino acids. Even though the chemistries were similar in these two experiments, the carious lesion resulted only when glucose was present in the medium. The effect of glucose in caries production appears to be inhibited by buffering the media at a pH of 8.0 even though bacterial activity was present.

### STUDIES OF THE EFFECT OF DL-GLYCERIC ALDEHYDE ON THE DENTAL CARIES ACTIVITY IN WHITE RATS AND COTTON RATS

*James H. Shaw.*

The addition of increasing amounts of dl-glyceric aldehyde to saliva has been shown to result in progressive decreases in acid formation during incubation (Fosdick and Calandra, J. D. Res. 26:309, 1947). In order to demonstrate whether dl-glyceric aldehyde had an ability to inhibit the development of carious lesions in experimental animals, this material was incorporated into a purified caries-producing diet at levels of 0.5, 1.0 and 2.0 per cent. After 14 weeks on these regimens, white rats *(Mus norvegicus)* and cotton rats *(Sigmondon hispidus hispidus)* fed varying levels of racemic glyceric aldehyde developed the same average number and extent of carious lesions as the control animals fed only the caries-producing diet. The question was raised as to whether *in vitro* tests for inhibiting action on acid production would be related to the *in vivo* ability to prevent the development of carious lesions.

### THE USE OF RADIOACTIVE PHOSPHORUS IN THE STUDY OF THE TEETH OF CARIES-RESISTANT AND CARIES-SUSCEPTIBLE STRAINS OF ALBINO RATS

*Carl A. Hoppert and Ray L. Shirley.*

A comparative study was made of the teeth of 14th generation caries-resistant and 18th generation caries-susceptible albino rats in the age range of 6 to 60 days with respect to: (1) weight; (2) ash content; (3) phosphorus content expressed as per cent of dry weight of the teeth and of the ash; (4) rates of deposition in and removal of radioactive phosphorus from the teeth after intraperitoneal injection of the isotope; (5) occurrence of radioactive phosphorus in the teeth of offspring whose mothers were injected with the isotope during pregnancy, and (6) absorption of radioactive phosphorus *in vitro* by the teeth from aqueous solution. No significant differences were observed. The explanation for the striking differences in the caries-susceptibiliy between the two strains of rats remains to be found.

### THE AMMONIA CONTENT OF THE MOUTH

*W. E. Ludwick and L. S. Fosdick.*

The total ammonia of the mouth, and that which can be removed by toothbrushing was determined. The procedures were performed on caries-active and caries-inactive mouths and the results were compared. The ammonia that could be removed by brushing was determined by brushing the teeth, using permutit as the dentifrice, after which the brushings were analyzed by the usual Nessler procedure. For the total ammonia, the debris removed by means of a dental prophylaxis was added to the tooth brushings after which the usual analysis was repeated. There was no significant difference between the ammonia content of caries-active and caries-inactive mouths. The amount of ammonia that could be removed from any mouth was quite constant. The amount of ammonia that could be removed by brushing the teeth varied from individual to individual and averaged 80 per cent of the total.

### THE OCCURRENCE OF BETA-HEMOLYTIC STREPTOCOCCI ON THE GINGIVA OF NORMAL YOUNG ADULTS

*Maury Massler and J. B. MacDonald.*

Although there have been many studies of the occurrence of beta-hemolytic streptococci on the mucous membranes of the throat and nasal passages in both health and disease, little attention has been paid to these organisms in the oral cavity proper.

The tonsillar fossae and labial gingivae of the lower anterior teeth of approximately 500 unselected medical and dental students were investigated for the occurrence of beta-hemolytic streptococci, by means of swabbings from

these areas cultured upon ordinary blood agar plates.

It was found that the prevalence of beta-hemolytic streptococci on the gingiva was approximately the same as upon the mucosa of the throat (6 per cent and 10 per cent respectively). However, the same person seldom (in only 30 per cent of the positive plates) showed positive cultures from both gingiva and throat at the same time.

### CHEMICAL STUDIES IN PERIODONTAL DISEASE

*B. Cohen and L. S. Fosdick.*

The glycogen content of the gingival tissue of normal rabbits and of animals suffering from alloxan-produced diabetes has been determined. There is a statistically significant decrease in the gingival glycogen of the animals suffering from the alloxan injections and diabetes.

### CHEMICAL STUDIES IN PERIODONTAL DISEASE

*C. A. Ostrum, W. G. Skillen and L. S. Fosdick.*

Orthodontic appliances were placed on the anterior teeth of dogs in such a manner that occlusal trauma would be produced. Tissue changes characteristic of occlusal trauma were produced but no changes in the glycogen content of the gingival tissue were observed.

### THE EFFECT OF CERTAIN LUBRICATING AGENTS AND COARSE FOODS UPON THE CORNIFICATION OF THE ORAL MUCOSA OF THE WHITE RAT

*Abraham Perlman.*

The addition of 10 per cent vegetable oil to dried whole kernel corn and corn meal diets was seen to antagonize their dehydrating and compressing effects upon the mandibular gingiva of the albino rat. The stratum corneum of these animals consisted of large polygonal cells with distinct cell boundaries, and the stratum spinosum was composed of large cells with deeply staining centrally placed nuclei. This was in contrast to the stratum corneum of the corn-fed animals which was on the average 10 $\mu$ less in height and consisted of dehydrated, compressed cells with indistinct cell outlines. The stratum spinosum consisted of small, finely granular cells.

Because identical results were obtained when liquid petrolatum was substituted for mineral oil, it was felt by the author that the action of vegetable oil is a local one and is probably due to its lubricating property. The oils probably act to prevent cell dehydration, and the cells remain soft and full of cytoplasm.

### THE TOOTH PULP AS AN ALGESIMETRY SITE

*Stanley C. Harris and Norma E. Brandel.*

An effort has been made to test the reliability and validity of electrical excitation of the tooth pulp as an algesimetric procedure. Reliability studies consisted of pain threshold determinations of four consecutive tests at 15 minute intervals on each of two filled teeth in 14 subjects on six or eight different days. Statistical treatment of the data, by analysis of variance reveals that there is a significant difference between two teeth in the same head, different subjects and different days on the same tooth and subject, but no significant difference occurred on 15 minute trials on any tooth during the same day.

When the study was entended, on the same subjects to tests running at 15 minute intervals after oral administration of 1 gr. codeine phosphate, 5 gr. aspirin plus 5 gr. Phenacetin, calcium lactate placebo or no medication, the increments from premedication thresholds of the three drugs were significantly greater than when no capsule was given. However, there was no significant difference between any of the increments obtained by the two drugs or the placebo.

Correlation between increments of pairs of teeth after medication was significant on all three drugs and the "dry" run. However, the correlation was best, quantitatively, for codeine, next best for aspirin-Phenacetin and least for no medication.

The results are considered indicative of the need for an instrument which measures the stimulating current directly, not indirectly. They also indicate that aspirin is not analgesic but probably relieves pain by some other mechanism.

### HYPOPROTEINEMIA IN RELATION TO THE DENTAL TISSUES

*Harold A. Hunter.*

Eight groups of four adult female albino rats were placed on different diets for a period of 13 weeks. Other than controls, the experimental diets were protein deficient, two groups being fed amino acid mixtures deficient in methionine and lysine respectively, and a third group receiving no protein. Isocaloric consumption was maintained in these and two control groups by limiting daily feedings to a

quantity equal to that of the group consuming the least amount on the previous day. No abnormalities were observed macroscopically or microscopically in the dental tissues except in a decrease in weight (about 26 per cent average) and buccolingual diameter in the lower incisor. Rate of eruption remained normal. Gross changes included loss of weight (most marked in the protein-free group), alopecia, decrease in serum proteins and hemoglobin. Atrophic changes were observed in many tissues and organs and were most marked in the skeletal musculature and reproductive organs.

### THE SILVER IMPREGNATION METHOD APPLIED TO THE DENTIN MATRIX OF RACHITIC RATS AND TO THAT OF RATS WITH HEALING RICKETS

*J. T. Irving.*

The incisor teeth of rachitic rats and those of rachitic animals in which healing had been induced by various procedures, were stained, after microscopic sectioning, with hematoxylin and eosin and by the method of silver impregnation, and the appearances compared. Basophilic tissues were found to be argyrophobic, and vice versa, as has also been reported for other tissues. In both low calcium and low phosphorus rickets, differentiation of the dentin matrix into fibrils and cementing substance takes place, but calcification is delayed. Agents causing calcification to recommence in the teeth of rachitic rats have at least two actions: they cause calcification of the cementing substance to be accelerated and finally to occur in the normal situation; and they also affect the differentiation of new matrix in such a way that more cementing substance and fewer fibrils are laid down.

### DISTRIBUTION OF RADIOACTIVE GALLIUM IN THE TEETH AND JAWS OF EXPERIMENTAL ANIMALS

*James A. English and Horace C. Dudley.*

Radiogallium in the form of soluble gallium lactate (pH 7.0-7.4) was injected subcutaneously into rats and rabbits. The dosage was 0.2 to 0.4 millicuries of $Ga^{72}$ per kilogram of body weight (6 mg. per kg.), which is well below the toxic level. The animals were killed in six hours and thin sections (50-100$\mu$) were made of the bone and teeth by cutting with high speed abrasive disks and grinding to the desired thickness against an abrasive wheel. These thin sections were placed next to special roentgen ray film for 24-48 hours, and autoroentgenograms were made. By comparing the autoroentgenograms with pictures of the ground sections it was determined that radiogallium is predominantly deposited in endosteum, periosteum, tooth pulp and peridontium. There is a moderate deposition in cancellous bone. Cortical bone and the dentin of the root portion of teeth take a barely perceptible amount of radiogallium, whereas coronal dentin and enamel give no indication that any radiogallium is absorbed.

### THE RELATIONSHIPS BETWEEN THE PHYSICAL CHARACTERISTICS OF THE DIET AND THE WATER CONTENT OF MONKEY TEETH

*N. A. Di Salvo and H. H. Neumann.*

Considering that: (1) it has been suggested that soft diets and high caries incidence may be related in man; (2) bone reacts to disuse with atrophy which is characterized by an increase in water content of the tissue; (3) sound tissues from carious teeth contain more water than tissues from noncarious teeth, an attempt is made to determine whether the degree of use of the masticatory apparatus can affect the tissues of fully erupted teeth (as measured by their water content). Accordingly ten Rhesus monkeys were divided into two groups of five. The control group received food requiring vigorous mastication while the diet of the experimental group required little or no chewing.

After eight weeks, the four first permanent molars were removed from each animal, cleaned and weighed after drying in air for 12 hours; subsequently the teeth were dried to constant weight and reweighed. The weight loss was then calculated as a per cent of the initial weight.

The control teeth lost an average of 8.17 per cent, the experimental an average of 9.05 per cent; that is the molars of the animals on an entirely soft diet had a water content 10.77 per cent higher than the molars of the vigorously chewing animals.

# *Book Reviews*

## TEETH AND PERSONALITY

*By American Medical Association. 84 pages with 40 illustrations. American Medical Association, Chicago, Ill., 1949.*

Reprints of articles written for *Hygeia* by dental and medical authorities presented in an attractive booklet form for reception room reading. It is illustrated with many photographs and sketches. The text is well written, clear and informative. The booklet contains answers to many of the questions commonly asked by the patient, concerning diet, home care of mouth and teeth, causes of crooked teeth, pain, false teeth, and so forth. This booklet should be found interesting and readable for the patients.

*Elsie Gerlach*

## LENGTH OF LIFE

*By Louis I. Dublin, Ph.D.: Alfred J. Lotka, D.Sc., and Mortimer Spiegelman, F.S.A. Revised edition. Index. 379 pages with 94 tables and 32 charts. Price $7. New York: The Ronald Press Company, 1949.*

The authors of this book have succeeded in making it very readable without compromising scientific method. True, it cannot be read swiftly as fiction; many of the concepts presented require study before they are understood. Nevertheless, it is replete with fascinating facts and the reader will find it entertaining as well as educational. Hundreds of factors affecting longevity are analyzed.

The encouraging story of progress in medicine and public health is well presented. In 1890, one out of every six or seven babies died within the first year of life; by 1946 the number had been reduced to one out of every 30 babies. The control of infectious diseases, resulting in increased longevity, has resulted in a relatively greater number of deaths from the degenerative diseases and cancer. It is estimated that if deaths caused by cardiovascular-renal diseases, currently the leading causes, could be eliminated, the average length of life would be increased by nine or ten years.

Males have a higher death rate than females. This is apparently a biologic phenomenon as it holds for all ages, including infancy. Nevertheless, the U. S. census consistently reports more males than females; nature compensates by providing more boy babies than girl babies. Mortality rates for the married are considerably lower than those for divorced, widowed and single persons. "The lower mortality of the married is usually attributed in part to the selection of the healthier lives by marriage and in part to the more healthful environment of family life."

Expectation of life is greatest in the agricultural states of the midwest and least in the southern tier of states. White males of Nebraska have at birth an expectation of 66.25 years while those of Arizona have an expectation of 56.83 years. Average length of life in India in 1931 was but 27 years while in the United States it was about 60 years.

The common assumption that long-lived parents tend to have long-lived children has been borne out by a number of statistical studies, but the relative influence of heredity and environment in this phenomenon has not been determined. Physicians are shown to have a mortality about equal to white males in general but much higher than men of comparable social position.

The book contains valuable chapters on the construction and use of life tables. It relates mortality to physical condition, including such factors as body build, blood pressure, respiratory diseases and heart murmurs. The history of the public health movement is delineated.

*B. Duane Moen*

## A DYNAMIC APPROACH TO ILLNESS: A SOCIAL WORK GUIDE

*By Frances Upham. First edition. 190 pages. Index. Price $3. New York: Family Service Association of America, 1949.*

In this book Miss Upham presents, concisely and comprehensively, the role of the social worker in the health field. The thorough manner in which she deals with the interrelationships of physical, social and emotional well being and the practical implications of their interdependence will make this book of great value not only to social workers but to all those working in the field of human welfare.

Pointing out that it is now recognized that an individual with an illness or problem of social adaptation should be understood and

treated as an entity, Miss Upham writes that the problem is now of differentiating the functions between the various helping professions.

With special attention to the functions of the social worker, the four main points of the book are outlined as follows: (1) The meaning of illness and medical care to patient and family. (2) Specific information about certain physical problems including diagnosis and treatment and standards of care to help the social worker in dealing with ill or handicapped persons. (3) The interrelationships between the various professions working together in the interests of the patient and his family. (4) The specific contributions of the social worker in the prevention and treatment of illness.

This is a family oriented book and in no place does the author lose sight of the fact that in helping the patient one also has to help his family. "Not only must the patient be viewed as a total personality but his needs must be related to the interacting forces in the family." Turning away from the overprotectiveness of earlier philosophies in social work, the book emphasizes the value of having the patient or client take maximum responsibility for his own affairs—medical appointments, treatments, and so forth.

There is a frequent tendency for social workers to attempt to facilitate treatment by acting as an intermediary between physician and patient. Miss Upham points out that, instead, case work procedure should attempt to strengthen the relationship of the patient to each expert in the various treatment steps.

The chapter on "Chronic and Recurrent Illnesses in Children," particularly the material on the supportive role of the parents and the respective parts played by the mother and father at different stages of the child's emotional growth, will be of special interest to those working in the fields of parent education and child development.

Finally, because this book sets forth standards that are far ahead of our present facilities for caring for the sick and handicapped, it presents both a challenge and a goal toward which we can all intelligently work.

*Freda S. Kehm*

## ACCIDENT FACTS, 1949 EDITION

*By the National Safety Council, Chicago. 96 pages. 60 cents. 1949.*

This booklet contains a comprehensive statistical report of accidents in the United States in 1948, with numerous comparisons to accident rates in previous years. It is replete with tables and easy-to-read graphs. Accidental deaths are classified according to causes, industries, states and major cities. Injuries, too, are classified in several ways. A sizable section of the booklet is devoted to motor vehicle accidents, including the number of deaths by cities in 1947 and 1948 for all cities with a population of over 10,000.

Surprisingly, the accident rate in 1948, 67.1 per 100,000 population, was lower than for any other year for which records are available. This record was achieved in spite of increasing industrialization and motor travel. The death rate per mile from motor vehicle accidents in 1948 was the lowest on record, and was 9 per cent lower than in 1947.

While it is true that encouraging gains have been made in accident prevention, the accident toll is still of tragic proportions. As the report points out, "If you make a 10-minute safety speech, 2 persons probably will be accidentally killed and 200 injured while you talk. Costs will amount to $140,000." Accidents brought death to 98,000 Americans in 1948 and disabling injuries to another 10,300,000. When it is considered that practically every accident is regarded as preventable, it becomes evident that this reduction in death rates does not justify complacency.

*B. Duane Moen*

## THE 1949 YEAR BOOK OF DENTISTRY

*Edited by Stanley D. Tylman, Donald A. Keys, John W. Knutson, George R. Moore, Hamilton B. G. Robinson and Carl W. Waldron. 656 pages with 404 illustrations. Index. Price $5. Chicago: The Year Book Publishers, Inc., 1949.*

The current edition of the Year Book of Dentistry covers seven general classifications in the dental field: Restorative and Prosthetic Dentistry, Caries, Public Health Programs, Children's Dentistry, Orthodontics, Pathology and Surgery, and Roentgenography. Main classifications are divided into sections. Dental publications from the United States, as well as from other English-speaking countries, have been reviewed and abstracted to present this over-all survey of dental literature for 1949.

Following the current trend of interest in public health aspects of dentistry, one section is devoted to material on public health programs in the United States and Canada. Included are articles on such topics as: dental treatment needs of children aged 6 to 16 in New York City, dental health in a community health program, dental health education in elementary and secondary schools, role of

dentists in cancer control, the use of auxiliary personnel and national dental health programs in Canada, Switzerland, and so forth.

Two new editors, Dr. Hamilton B. G. Robinson and Dr. John W. Knutson, are added to the editorial board of this volume.

A new policy has been adopted in editing. Formerly, material was arranged within departments, each section edited by one man. In this volume, material is arranged by subject, with all editors commenting on articles throughout the book.

There is a comprehensive subject and author index.

*Martha Ann Mann*

### HEALTH SERVICE AREAS: ESTIMATES OF FUTURE PHYSICIAN REQUIREMENTS

*By Joseph W. Mountin, Elliott H. Pennell and Anne G. Berger. Public Health Bulletin No. 305. 89 pages. Price 45 cents. Washington, D.C.: Superintendent of Documents, U. S. Government, 1949.*

This study, which consists of detailed nationwide tabulation of the number of active non-Federal physicians engaged in selected types of practice at the county level, is intended to reveal the number of physicians needed in 1960 to meet certain minimum measures of adequacy. Although predicting that the number per 100,000 population will increase, the authors reach the conclusion that the total will not be "adequate" ten years from now.

No special reason is given for selecting the year 1960 for application of the "minimum measures of adequacy," and the data assembled suggest strongly that by 1980, for example, many of the desired totals will actually have been attained. With the natural inference that the trend will be progressive, there may well be some doubt that serious inadequacies will be observed in the intervening years.

Three sets of standards are established by the authors as base lines, population distribution being the chief criterion. However, there has been no attempt to include morbidity and mortality rates for the various health service regions. As a result, it is difficult to establish that the three "pilot" regions are necessarily most satisfactory for selection as such.

Validity of this method is open to question because it would tend to reveal shortages in whatever profession or occupation might be studied. Certainly the more or less arbitrary assumptions that are set up without adequate statistical justification should be accepted with reservations.

*William W. Bolton*

### MODERN TRENDS IN PUBLIC HEALTH

*By Arthur Massey, M.D., D.P.H., D.P.A. 581 pages with 42 illustrations. Index. Price $12.50. New York: Paul B. Hoeber, Inc., 1949.*

This book is a work on public health of many contributors, which include consulting physicians, general practitioners, public health officers and university teachers. The publication appears during a transitional period and at a time when medicine and dentistry have undergone, and are undergoing changes under the National Health and National Insurance Act in Great Britain.

The subjects embrace The public health aspect of diet, nutrition, social medicine as an academic discipline, laboratory contributions to epidemiology, the concept of the general practitioner, housing, periodic medical inspections, mental health, training of the physician and the pediatrician and so forth.

The book is well written and gives a good resume of the public health under the changing services and a shift of services of the public health worker from environmental to personal services, the social plan and expectations in the years to come.

The dental section which occupies 20 pages also has a good bibliography and references. It reviews the history of dentistry, the contribution of dentistry to public health and presents the present social philosophy.

It is quite interesting to see that the author of this section notes the divergent tendencies and development of the practice of dentistry in the United States and Great Britain. The importance of the preservation of the teeth and the theories of dental caries are discussed. The dental services are then described for school children, including orthodontics, dental services in factories, dental service for the tuberculous and for the military services. The subject of research in dentistry is sketched.

Among the topics treated are: the role of diseases of the oral tissues, diseases of the pulp, fluorine, prevention of cancer, psychosomatics in dentistry and the effect of dentistry on mental disease.

The author concludes with W. Fischer's hopes, "In the interest of humanity we must be ever building up, extending and carrying out what we are now so well able to do by the faithful practice of all the advances of dental surgery to benefit all classes from the youngest to the oldest, from the richest to the poorest."

The book is recommended for the public health worker and the student in public health. It is well indexed and has a good bibliography.

*Harry Strusser*

## DENTAL CARIES, CLINICAL AND EXPERIMENTAL INVESTIGATIONS

*By T. Ockerse, D.M.D., D.D.S. 80 pages with 19 tables, 10 maps and appendix. Pretoria, South Africa, Department of Health, 1949. A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Science in the Faculty of Science, University of Pretoria, December 1947.*

Dr. Ockerse, before presenting his conclusions reviews tooth development, contributory factors of dental caries, fluorine and dental caries and reports the findings of clinical surveys.

In the endemic fluorosis areas of South Africa, 28 per cent of the children showed dental caries as compared with the average of 85 per cent in other areas. The highest caries incidence rate was revealed among the children living in areas where bread and sweet potatoes formed the principal items of their diet. The lowest caries incidence rate was associated with a low carbohydrate and a high protein diet.

In the experimental investigations the writer found that the addition of sweets to a non-caries producing diet, initiated caries in the rat and when added to the caries producing diet, they greatly accelerated the process of decay. High caries susceptibility rats were bred by close inbreeding. Ockerse also reports that the caries incidence rate was very high among children living in the areas where citrus fruits are grown.

*J. M. Wisan*

## DENTAL ANATOMY

*By Robert C. Zeisz, D.D.S., and James Nuckols, D.D.S. 486 pages, with 427 illustrations. Index. Price $14.00. St. Louis: C. V. Mosby Company, 1949.*

A text on the form and function of the permanent and deciduous teeth. The book is a handsome one; choice and well organized material with bold headings and subheadings make it a pleasure to read and study.

In the preface the purpose of the book is stated: "to convey to the student and practitioner of dentistry a complete account of one of the fundamentals of his science," namely, dental anatomy. It accomplishes exactly this and the authors have not seen fit to embellish and confuse it with related subjects. The artistry which is of very high caliber is the work of Mr. Walter B. Schwarz. He must be credited with a large share of the success the book will enjoy. It must be admitted that most of us have noticed and enjoy some definite but not always present anatomical features of certain teeth. Schwarz *et al* are no exceptions, but in spite of this, very few and insignificant are the inconsistencies in tooth form noticed by this reviewer.

Zeisz and Nuckolls have taken infinite pain to ensure the completeness of the subject which they have introduced in the first section of the book in a progressive and logical manner. A plea is made for unification of nomenclature in that section which seems timely and well thought out. The description of the anatomy of the permanent dentition is divided into sections to include both upper and lower incisors, cuspids, biscuspids and molars. That of the deciduous dentition is handled in a like manner. The occlusions of the individual teeth are thoroughly described and classified as to centric, protrusive, working and balancing. Descriptions of the anatomy and occlusions are well written and are informative if the reader will concentrate and take them in small doses. An understanding of raised and depressed contours as well as general shape of all the teeth is made readily available in the accompanying schematic drawings.

The book as reference deserves a place in all dental libraries.

*John Sproule*

## THE A B C'S OF DENTAL DECAY

*By Charles A. Sweet, D.D.S. 15 pages. San Francisco: College of Physicians and Surgeons, School of Dentistry.*

The general plan of using the familiar formula of the A B C's to help parents understand why their children are subject to dental decay is a good one. But the section on do's and don'ts of decreasing dental decay by diet is not specific enough to help parents understand how to assist their dentists in controlling this disease.

The recommendations given in the second section are too general to be a guide for the parents. Specific food patterns, menus or other foods should be given. As it now stands, even if foods from each of the items listed are eaten, the diet would likely be unsatisfactory. The kind of food eaten is not only of importance, the quantities must be considered also.

Except for the temporary expedient of providing a drastically low carbohydrate diet in initial attempts to reduce the lactobacillus count, it is unwise to group potatoes in the same category with sweet desserts, candy, and white bread. There would appear to be no special virtue to use of honey in place of sugar in the recipes given.

*Dorothea F. Radusch*

# *Deaths*

Anderson, Rudolph N., Sherman Oaks, Calif.; Omaha Dental College, 1906; died March 7; aged 65.

Atwood, Clarence A., Beloit, Wis.; School of Dentistry, Northwestern University, 1898; died March 11; aged 78.

Beckett, John P., Oakland, Calif.; College of Physicians and Surgeons, 1911; died March 14; aged 71.

Bernstein, Leon I., Ventnor, N. J.; died March 12; aged 78.

Black, Howard L., Escondido, Calif.; College of Dentistry, University of Nebraska, 1923; died March 7; aged 47.

Boswell, James H., Long Beach, Calif.; Louisville College of Dentistry of Centre College, 1899; died March 12; aged 74.

Boyd, Herman J., Cambridge, Ohio; Baltimore College of Dental Surgery, 1895; died February 27; aged 79.

Brookfield, Benjamin M., Idaho Falls, Idaho; Des Moines College of Dental Surgery, 1903; died March 15; aged 69.

Brown, Jacob H., Buffalo; School of Dentistry, University of Buffalo, 1898; died February 9; aged 72.

Buckley, Jeremiah D., Providence, R. I.; School of Dentistry, Temple University, 1909; died March 6; aged 71.

Chambers, George E., Lafarge, Wis.; College of Dentistry, University of Iowa, 1891; died March 8; aged 81.

Chambers, James M., Huron, S. D.; Dental Department, Cleveland University of Medicine and Surgery, 1895; died March 8; aged 78.

DuPuis, Louis V. W., Seattle; Philadelphia Dental College, 1887; died March 1.

Fenton, Michael T., Hartford, Conn.; Dental School, Harvard University, 1916; died March 17; aged 55.

Fillenwarth, Leland T., Minneapolis; College of Dentistry, University of Iowa, 1915; died March 14; aged 58.

Gentry, Grant C., Chicago; School of Dentistry, Washington University, 1914; died March 23; aged 59.

Gifford, Arthur B., Lincoln, Neb.; Lincoln Dental College, 1882; died March 14.

Giron, Hector F., Los Angeles; College of Dentistry, University of California, 1924; died March 20; aged 49.

Gottlieb, Bernhard, Dallas, Texas; died March 16; aged 64.

Gray, E. Gale, Victoria, Texas; Kansas City Dental College, 1904; died February 4; aged 78.

Hagen, John A., Chicago; Chicago College of Dental Surgery, 1915; died January 15.

Hamlet, John M., Winston-Salem, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1888; died December 24; aged 82.

Hartwell, Daniel E., Inglewood, Calif.; died in March; aged 90.

Heard, W. Scott, New York; New York College of Dentistry, 1917; died March 15; aged 69.

Hickey, Mallie B., Seaside, Ore.; College of Dentistry, University of Iowa, 1894; died February 28; aged 84.

Hillman, Harold S., Pawtucket, R. I.; Dental School, Tufts College, 1909; died March 14; aged 40.

Holbert, George W., Westfield, Pa.; Philadelphia Dental College, 1911; died March 3; aged 62.

Hurd, Everett M., Portland, Ore.; School of Dentistry, Washington University, 1893; died February 17.

Hurwitz, Leon M., Chicago; Chicago College of Dental Surgery, 1908; died March 24; aged 65.

Jayne, William B., West Liberty, Iowa; College of Dentistry, University of Iowa, 1894; died March 12; aged 80.

Kapp, Joseph A., Highland, Ill.; School of Dentistry, St. Louis University, 1929; died March 23; aged 44.

Kelly, Joseph J., Washington, D. C.; School of Dentistry, Georgetown University, 1928; died March 21; aged 49.

Kemper, Harold A., Lewisburg, Ohio; School of Dentistry, St. Louis University, 1930; died March 15; aged 44.

Lally, Edward J., Niles, Ohio; School of Dentistry, University of Pittsburgh, 1928; died March 15; aged 47.

Lane, John O., New York; New York College of Dentistry, 1916; died March 27; aged 58.

Langton, Ronald F., San Francisco; died February 28; aged 53.

Leavelle, Arnaud B., Los Angeles; College of Dentistry, University of Southern California, 1905; died September 27; aged 72.

Lefkowitz, Norman, New York; School of Dental and Oral Surgery, Columbia University, 1939; died March 23; aged 35.

Levy, Roman J., Bronx, N. Y.; School of Dentistry, University of Pennsylvania, 1895; died March 7; aged 79.

Lewis, M. B., Culpeper, Va.; Dental Department, University College of Medicine, 1905; died in January; aged 65.

Liere, Frank W., Danville, Ill.; died March 20; aged 50.

McMurray, Milton, Santa Ana, Calif.; College of Dentistry, University of California, 1897; died March 1; aged 85.

Melton, James R., Charleston, W. Va.; died March 1; aged 90.

Morris, Glenn J., Cheyenne, Wyo.; School of Dentistry, University of Denver, 1915; died March 21.

Mowry, Ira B., Humboldt, Neb.; College of Dentistry, Creighton University, 1914; died February 15; aged 65.

Murray, Timothy H., Brooklyn; College of Dentistry, New York University, 1894; died January 6, aged 78.

Nicholas, Nicholas P., Chicago; Chicago College of Dental Surgery, 1919; died February 19; aged 63.

O'Herrin, James C., Chicago; Chicago College of Dental Surgery, 1903; died March 17; aged 74.

Ozias, George E., Quakertown, Pa.; Philadelphia Dental College, 1895; died March 7; aged 74.

Paolucci, Albert C., Milton, Mass.; died January 4; aged 63.

Pasch, Frederick T., Queens Village, N. Y.; School of Dentistry, University of Pennsylvania, 1917; died January 11; aged 55.

Patterson, Fred I., Decatur, Ind.; School of Dentistry, Indiana University, 1905; died January 8; aged 67.

Pearson, Ernest A., Logan, Utah; Dental School, Northwestern University, 1926; died February 22; aged 51.

Peele, Roscoe E.; Wilmington, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1903; died March 14; aged 72.

Peters, Charles F., Peoria, Ill.; died January 5; aged 91.

Peters, William A., Chicago; Dental School, Northwestern University, 1903; died March 26; aged 75.

Peterson, Theodore O., Brooklyn; College of Dental and Oral Surgery, 1912; died January 15; aged 62.

Piper, Jessie R., Newville, Pa.; died January 3.

Pollum, Bert W., Dubois, Pa.: School of Dentistry, University of Pittsburgh, 1925; died December 13.

Potter, Harry R., Los Angeles; College of Dentistry, University of Southern California, 1926; died February 13; aged 46.

Powers, Edmund G., Pasadena, Calif.; died March 1; aged 85.

Prendergast, M. John, Chicago; Chicago College of Dental Surgery, 1896; died February 28; aged 81.

Price, John B., Philadelphia; School of Dentistry, University of Pennsylvania, 1926; died January 16; aged 51.

Pyle, D. Franklin; Washington, D. C.; School of Dentistry, North Pacific College of Oregon, 1915; died March 21; aged 86.

Ramsey, Alvah D., Norfolk, Va.; School of Dentistry, Medical College of Virginia, 1925; died June 6.

Redman, Benjamin F., Oskaloosa, Iowa; Chicago College of Dental Surgery, 1899; died November 25; aged 73.

Reed, Charles H., Attleboro, Mass.; Dental School, Harvard University, 1905; died in January; aged 67.

Reel, Earl H., Chicago; School of Dentistry, St. Louis University, 1917; died March 2; aged 55.

Reeves, Ivey L., Orangeburg, S. C.; School of Dentistry, Vanderbilt, University, 1893; died December 16; aged 94.

Reynolds, Warren W., Clarksburg, W. Va.; Dental School, Northwestern University, 1897; died February 17; aged 78.

Rhodes, Harry R., Corry, Pa.; School of Dentistry, University of Pittsburgh, 1923; died January 21; aged 53.

Riskin, Reuben S., Amesbury, Mass.; died February 4; aged 53.

Roberts, Howard E., Philadelphia; Pennsylvania College of Dental Surgery, 1881; died February 17; aged 94.

Robertson, Harry L., Cliffside, N. C.; Atlanta Southern Dental College, 1924; died January 28; aged 53.

Rodgers, Clarence J., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1933; died March 9; aged 43.

Rosenthal, Isidor H., New York; Philadelphia Dental College, 1911; died January 22; aged 61.

Roswurm, Chester C., Cleveland; School of Dentistry, Western Reserve University, 1911; died December 26; aged 53.

Rudersdorf, William G., Waupaca, Wis.; Dental School, Marquette University, 1912; died March 12; aged 58.

Rule, John S., Hampton, Iowa; Dental School, Marquette University, 1906; died March 6; aged 67.

Rutrough, Bruce W., Roanoke, Va.; Baltimore College of Dental Surgery, University of Maryland, 1924; died in November; aged 59.

Saks, Samuel H., Superior, Wis.; Dental

School, Marquette University, 1928; died February 11; aged 45.

Sartor, Lester M., Indianapolis; School of Dentistry, Indiana University, 1917; died March 17; aged 60.

Scharlott, Samuel K., Marietta, Ohio; College of Dental Surgery, University of Michigan, 1897; died February 18; aged 80.

Schoenfeld, Morris, New York; New York College of Dentistry, 1908; died March 14; aged 71.

Schreiber, Cecil C., Des Moines, Iowa; College of Dentistry, University of Iowa, 1918; died January 14; aged 56.

Schuman, Herman, Forest Hills, N.Y.; School of Dentistry, Temple University, 1929; died February 24; aged 48.

Sebold, Edwin J., Syracuse, N. Y.; School of Dentistry, University of Buffalo, 1916; died March 2; aged 57.

Shapiro, Elias, Jersey City, N. J.; New York College of Dentistry, 1919; died February 25; aged 53.

Sheffer, Will G., San Jose, Calif.; College of Dentistry, University of California, 1923; died February 15; aged 57.

Sickles, Caleb M., Tiffin, Ohio; College of Dentistry, Ohio Medical University, 1904; died January 30; aged 69.

Simmerman, George H., Philadelphia; Pennsylvania College of Dental Surgery, 1890; died January 13; aged 84.

Simmons, John R., Greenville, S. C.; College of Dentistry, University of Minnesota, 1923; died March 14; aged 54.

Smith, Don H., Lancaster, Pa.; died March 7; aged 37.

Smith, Harl V., Jerome, Idaho; Chicago College of Dental Surgery, 1916; died January 4.

Smyser, Harley B., Wichita, Kan.; Kansas City Dental College, 1887; died January 14; aged 80.

Sniffen, David A., White Plains, N. Y.; New York College of Dentistry, 1894; died February 1; aged 76.

Snow, Arthur B., Saginaw, Mich.; College of Dental Surgery, University of Michigan, 1898; died March 24; aged 75.

Spangler, Solomon E., Somerset, Ohio; College of Dentistry, Ohio Medical University, 1907; died February 3; aged 69.

Speer, Albert H., Long Beach, Calif.; Louisville College of Dentistry of Centre College, 1896; died January 17; aged 81.

Spencer, Robert M., Gordonsville, Va.; Dental Department, University College of Medicine, 1910; died November 1.

Stankard, Frederick A., Boston; School of Dentistry, Georgetown University, 1913; died April 20; aged 62.

Staples, Jeffery L., Minneapolis; died January 30; aged 50.

Stapleton, E. F., King, Wis.; died April 22; aged 64.

Starr, Ernest E., Tigard, Ore.; School of Dentistry, North Pacific College of Oregon, 1907; died April 2; aged 73.

Stevens, Bert L., Bloomington, Ill.; Dental School, Northwestern University, 1900; died January 23; aged 72.

Stevens, John F., Lancaster, Pa.; Baltimore College of Dental Surgery, University of Maryland, 1891; died March 31; aged 85.

Stewart, Frank A., Girard, Ill.; Chicago College of Dental Surgery, 1905; died March 17; aged 67.

Stewart, John A., Gary, Ind.; died April 7; aged 56.

Stoffel, Henry G., Portland, Ore.; College of Dentistry, University of Iowa, 1928; died March 30; aged 45.

Stookey, Quinby, Benicia, Calif; died April 6; aged 38.

Strikland, William H., San Francisco; died February 8; aged 54.

Stuart, Thomas R., Ithaca, N. Y.; Philadelphia Dental College, 1895; died April 15.

Stump, Lorentz K., Philippi, W. Va.; School of Dentistry, Georgetown University, 1923; died February 8; aged 50.

Sturdevant, George O., Lincoln, Neb.; Omaha Dental College, 1905; died April 14; aged 66.

Sullivan, Francis C., St. Louis; School of Dentistry, St. Louis University, 1917; died January 3; aged 52.

Summers, Charles A., Aikin, Ill.; died December 26; aged 75.

Swanbeck, George C., St. Peter, Minn.; College of Dentistry, University of Minnesota, 1914; died January 13; aged 58.

Swartz, Ray, Lompoc, Calif.; College of Dentistry, University of Southern California, 1915; died April 13; aged 55.

Sweet, Wilbert S., Springfield, Mo.; Dental School, Northwestern University, 1898; died March 31; aged 80.

Swisher, Frank H., Columbus, Kan.; Western Dental College, 1919; died March 26; aged 56.

Talbot, John A., Pine Bluff, Ark.; Western Dental College, 1905; died December 26; aged 67.

Tamura, Hideo, Wailuki, T. H.; Dental School, Northwestern University, 1932; died January 16; aged 42.

Tatom, William E., Florence, Ore.; died March 25; aged 87.

Taylor, Joseph L., Newtonville, Mass.; Boston Dental College, 1894; died March 3; aged 79.

Terhellen, Emil W., St. Louis; School of Dentistry, Washington University, 1901; died February 27; aged 70.

Terry, George L., San Diego, Calif.; died March 21; aged 82.

Thomas, Therese B., Arlington, Mass.; Dental School, Tufts College, 1904; died December 19; aged 67.

Thompson, Charles E., Oxford, N. Y.; School of Dentistry, Temple University, 1886; died February 7; aged 89.

Thompson, Paul L., Forest City, Iowa; College of Dentistry, University of Iowa, 1910; died in October.

Tibbetts, Zephremiah H., Lawrence, Kan.; Dental Department, Marion-Sims College of Medicine, 1897; died April 20; aged 83.

Tillman, William T., San Diego, Calif.; died February 16; aged 86.

Tinslar, Fred S., Lebanon, Mo.; died March 26.

Toole, Lewis L., Columbia, S. C.; Atlanta Dental College, 1902; died in March; aged 73.

Tracy, John F., Springfield, Mass;. Baltimore College of Dental Surgery, 1905; died December 27; aged 69.

Trompen, Andrew N., Chicago; Dental School, Northwestern University, 1903; died January 21; aged 78.

Truesdell, Charles M., Taylors Falls, Minn.; Pennsylvania College of Dental Surgery, 1887; died February 15; aged 90.

Turner, Harry H., Syracuse, N. Y.; Kansas City Dental College, 1891; died February 23; aged 74.

Van Diver, Edward R., Fayette, Ala.; died March 1.

Van Meter, Frank R., Cincinnati; Ohio College of Dental Surgery, University of Cincinnati, 1897; died April 20; aged 85.

Van Valin, Shirley J., Omaha; died February 16; aged 66.

Van Wagner, Roy W., West Cheshire, Conn.; Philadelphia Dental College, 1901; died January 30.

Voelker, Joseph W., Takoma Park, Md.; Baltimore College of Dental Surgery, University of Maryland, 1921; died March 28; aged 51.

Waller, C. Charles, New York; School of Dental and Oral Surgery, Columbia University, 1917; died February 21; aged 52.

Walsh, Thomas F., West Orange, N. J.; New York College of Dentistry, 1898; died January 31; aged 57.

Wareham, Leslie V., Frankfort, Mich.; Chicago College of Dental Surgery, 1904; died December 27.

Warrenfells, Shannon P., Chattanooga, Tenn.; Atlanta Dental College, 1905; died March 28; aged 71.

Webster, Bernard J., Ashby, Mass.; School of Dentistry, University of Pennsylvania, 1906; died March 26; aged 67.

Weener, Joseph, Boston; Dental School, Tufts College, 1918; died in February; aged 58.

Weisberger, Abraham, New York; New York College of Dentistry, 1907; died April 13.

Wellington, Frederick E., Winchendon, Mass.; Dental School, Harvard University, 1912; died March 5; aged 58.

Welty, Alva J., Peoria, Ill.; Chicago College of Dental Surgery, 1919; died March 5; aged 60.

White, Alfred W., Bristol, Tenn.; Dental Department, Meharry Medical College, 1911; died April 7.

White, Morris L., Indianapolis; Indiana Dental College, 1892; died April 15; aged 78.

Whitney, Valentine J., Pierre, S. D.; College of Dentistry, University of Iowa, 1918; died in March; aged 58.

Wiggins, Jasper M., Chattanooga, Tenn.; College of Dentistry, University of Tennessee, 1923; died February 15; aged 52.

Wilson, Lawton H., New York; College of Dental and Oral Surgery, 1899; died May 5; aged 73.

Winters, John C., Champaign, Ill.; died January 25; aged 81.

Wise, Harvey A., Seattle; died March 19.

Woodrow, Howard A., Elizabethtown, Pa.; School of Dentistry, University of Pennsylvania, 1898; died January 20; aged 82.

Wright, Thomas B., Hattiesburg, Miss.; Southern Dental College, 1901; died January 30; aged 80.

Wynn, Stanley A., East St. Louis, Ill.; School of Dentistry, St. Louis University, 1917; died March 11; aged 59.

Yale, William H., Menlo Park, Calif.; died February 15; aged 76.

Ziegler, Lorenz H., Mitchell, S. D.; Dental School, Northwestern University, 1914; died in April; aged 60.

Zielinski, Jacob B., Chicago; Illinois School of Dentistry, 1899; died February 7; aged 80.

Zipperman, Nathan M., Los Angeles; College of Dentistry, University of Minnesota, 1925; died March 11; aged 53.

# *Directory*

### OFFICERS

Philip E. Adams, President.....106 Marlborough St., Boston
Harold W. Oppice, President-Elect.....1002 W. Wilson Ave., Chicago
Bernerd C. Kingsbury, First Vice-President.....490 Post St., San Francisco
Don M. Hamm, Second Vice-President.....White Bldg., Clarksville, Ark.
Gerald G. Burns, Third Vice-President.....133 Clinton Ave., South, Rochester, N.Y.
Percy T. Phillips, Speaker, House of Delegates.....18 E. 48th St., New York
Harold Hillenbrand, Secretary.....222 E. Superior St., Chicago
C. Willard Camalier, Assistant Secretary.....1726 Eye St., N.W., Washington, D.C.
H. B. Washburn, Treasurer.....Lowry Medical Arts Bldg., St. Paul

### BOARD OF TRUSTEES

J. B. Carr, 1952, Seventh District.....Hume Mansur Bldg., Indianapolis
C. S. Foster, 1952, Tenth District.....Dows Bldg., Cedar Rapids, Iowa
Charles I. Taggart, 1952, First District.....139 Bank St., Burlington, Vt.
Robert P. Thomas, 1952, Sixth District.....Francis Bldg., Louisville, Ky.
William McGill Burns, 1951, Second District.....80 Hanson Place, Brooklyn
R. C. Dalgleish, 1951, Thirteenth District.....State Capitol, Salt Lake City
Willard Ogle, 1951, Twelfth District.....310 N. Ervay St., Dallas, Texas
Fred S. Shandley, 1951, Eleventh District.....Medical & Dental Bldg., Seattle
LeRoy M. Ennis, 1950, Third District.....4001 Spruce St., Philadelphia
L. H. Jacob, 1950, Eighth District.....Jefferson Bldg., Peoria, Ill.
James E. John, Sr., 1950, Fifth District.....Medical Arts Bldg., Roanoke, Va.
Daniel F. Lynch, 1950, Fourth District.....1678 Primrose Road, N.W., Washington, D.C.
Obed H. Moen, 1950, Ninth District.....Watertown, Wis.

### BUREAUS

*Chemistry:* J. Roy Doty, Director, 222 E. Superior St., Chicago
*Economic Research and Statistics:* B. D. Moen, Assistant Director, 222 E. Superior St., Chicago
*Library and Indexing Service:* Donald A. Washburn, Director, 222 E. Superior St., Chicago
*Public Information:* Herbert B. Bain, Director, 222 E. Superior St., Chicago

### COUNCILS

*Constitution and Bylaws:* Max E. Ernst, Chm., Lowry Medical Arts Bldg., St. Paul
*Dental Education:* R. W. McNulty, Chm., 1757 W. Harrison St., Chicago
Shailer A. Peterson, Secy., 222 E. Superior St., Chicago
*Dental Health:* Leo J. Schoeny, Chm., Maison Blanche Bldg., New Orleans
Allen O. Gruebbel, Secy., 222 E. Superior St., Chicago
*Dental Museum and Registry:* Henry A. Swanson, Chm., 1726 Eye St., N.W., Washington, D.C.
*Dental Research:* J. L. T. Appleton, Chm., 4001 Spruce St., Philadelphia
C. B. Hall, Secy., 1835 Eye St., N.W., Washington, D.C.
*Dental Therapeutics:* Thomas J. Hill, Chm., 2085 Adelbert Road, Cleveland
J. Roy Doty, Secy., 222 E. Superior St., Chicago
*Dental Trade and Laboratory Relations:* F. W. Herbine, Chm., 230 N. Fifth St., Reading, Pa.
Earl M. Eaton, Secy., American Trust Bldg., Cedar Rapids, Iowa
*Federal Government Dental Services:* R. H. Friedrich, Chm., 960 Park Ave., Plainfield, N.J.
*History:* L. W. Johnston, Chm., Republic Bldg., Denver

*Hospital Dental Service:* Edward C. Dobbs, Chm., 618 W. Lombard St., Baltimore

*Insurance:* L. D. Cleek, Chm., Medical Arts Bldg., Charleston, W.Va.
Paul W. Zillmann, Secy., 29 Walden Ave., Buffalo

*International Relations:* Stanley D. Tylman, Chm., 55 E. Washington St., Chicago

*Journalism:* Charles A. Wilkie, Chm., 1 Hanson Place, Brooklyn

*Judicial Council:* Ernest G. Sloman, Chm., 344 14th St., San Francisco

*Legislation:* E. Harold Gale, Chm., 142 Washington Ave., Albany, N.Y.
Francis J. Garvey, Secy., 222 E. Superior St., Chicago

*Membership:* H. C. Jarvis, Chm., Mercantile Library Bldg., Cincinnati

*National Board of Dental Examiners:* Walter H. Wright, Chm., 209 E. 23rd St., N.Y.
Gordon L. Teall, Secy., P. O. Box 71, Hiawatha, Kan.

*Relief:* John S. Owens, Chm., 407 Cooper St., Camden, N.J.
M. C. Hansen, Secy., Racine, Wis.

*Scientific Session:* William A. Garrett, Chm., Candler Bldg., Atlanta, Ga.
Robert G. Kesel, Secy., 808 South Wood St., Chicago

ADVISORY COMMITTEES

*Bureau of Chemistry:* Philip Jay, Chm., 715 S. Forest Ave., Ann Arbor, Mich.

*Bureau of Economic Research and Statistics:* L. M. FitzGerald, Chm., Roshek Bldg., Dubuque, Iowa

*Bureau of Library and Indexing Service:* John E. Gurley, Chm., 350 Post St., San Francisco

*Bureau of Public Information:* C. H. Jamieson, Chm., David Whitney Bldg., Detroit

SECTION CHAIRMEN

*Clinics:* Walter Buchmann, 25 E. Washington St., Chicago

*Full Denture Prosthesis:* A. H. Grunewald, Naval Dental School, National Naval Medical Center, Bethesda, Md.

*Operative Dentistry:* O. B. Coomer, Heyburn Bldg., Louisville, Ky.

*Oral Surgery:* Vernor H. Eman, 622 Medical Arts Bldg., Grand Rapids 2, Mich.

*Orthodontics:* George S. Callaway, 654 Madison Ave., New York

*Partial Denture Prosthesis:* Lewis W. Thom, 1546 Medical Arts Bldg., Minneapolis 2

*Pedodontics and Oral Hygiene:* John E. Chrietzberg, 222½ S. Fourth St., Springfield, Ill.

*Periodontia:* Harold G. Ray, College of Dentistry, University of California, San Francisco 22

*Practice Management:* Lloyd H. Dodd, 860 Citizens Bldg., Decatur 30, Ill.

*Research:* F. A. Arnold, National Institute of Dental Research, Bethesda, Md.

*Roentgenology:* Gordon M. Fitzgerald, College of Dentistry, University of California, San Francisco

*Scientific Exhibits:* Hermann Becks, 2240 Channing Way, Berkeley, Calif.

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
*222 East Superior Street, Chicago 11, Illinois*
WHitehall 4-6730

LON W. MORREY, *Editor* JOHN J. HOLLISTER, *Business Manager*

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear, and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. *Articles* are accepted with the understanding that they have not been published previously and that they are submitted solely to THE JOURNAL. *Advertising copy* must conform to the official standards established by the American Dental Association. *Notice of change of address* should be received one month before the change is to be effective. *Orders for reprints of* JOURNAL articles must be received by the Business Manager's office not later than the 15th of the month of issue in order to secure advantage of the lowest possible prices. Orders received after this date are subject to special quotation.

# *Announcements*

## AMERICAN DENTAL ASSOCIATION

| | | |
|---|---|---|
| Ninety-First Annual Session | Oct. 30-Nov. 2, 1950 | Atlantic City, N. J. |
| Ninety-Second Annual Session | Oct. 15-18, 1951 | Washington, D. C. |
| Ninety-Third Annual Session | Sept. 8-11, 1952 | St. Louis |

## MEETINGS OF STATE SOCIETIES

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| **Alabama** | April 16-18, 1951 | Birmingham | G. W. Matthews | 1922 Tenth Ave., S., Birmingham 5 |
| **Alaska** | Aug. 2-4 | Anchorage | C. N. Hoveland | Anchorage |
| **Arizona** | April 1951 | Tucson | H. G. DeWolf | Valley National Bank Bldg., Tucson |
| **Arkansas** | | | D. M. Hamm | White Bldg., Clarksville |
| **California** | April 16-18, 1951 | San Francisco | L. R. Ludwigsen | 450 Sutter St., San Francisco |
| **S. California** | April 2-4, 1951 | Los Angeles | C. A. Moss | 1401 S. Hope St., Los Angeles |
| **Colorado** | Oct. 4-7 | Colorado Springs | R. A. Downs | 724 Republic Bldg., Denver 2 |
| **Connecticut** | | | E. S. Arnold | 37 Linnard Rd., W. Hartford |
| **Delaware** | Jan. 10, 1951 | Wilmington | L. Kreshtool | 815 West St., Wilmington |
| **District of Columbia** | Mar. 11-14, 1951 | Washington | K. H. Wood | 202-1835 Eye St., N. W., Washington |
| **Florida** | Nov. 19-22 | Hollywood | L. M. Schulstad | Professional Bldg., Bradenton |
| **Georgia** | Oct. 8-11 | Atlanta | J. M. Heard, Jr. | Persons Bldg., Macon |
| **Hawaii** | Oct. 12-14 | Honolulu | J. H. Dawe | 810 N. Vineyard St., Honolulu 17 |
| **Idaho** | | | A. R. Cutler | Eastman Bldg., Boise |
| **Illinois** | May 7-10, 1951 | Peoria | P. W. Clopper | 623 Jefferson Bldg., Peoria 2 |
| **Indiana** | May 21-23, 1951 | Indianapolis | E. E. Ewbank | Kingman |
| **Iowa** | May 7-9, 1951 | Des Moines | H. I. Wilson | 639 Insurance Exchange Bldg., Des Moines |
| **Kansas** | May 6-9, 1951 | Wichita | F. A. Richmond | Brotherhood Bldg., Kansas City |
| **Kentucky** | April 2-4, 1951 | Louisville | A. B. Coxwell | 1976 Douglass Blvd., Louisville |
| **Louisiana** | April 26-28, 1951 | New Orleans | J. S. Bernhard | 407 Medical Arts Bldg., Shreveport |
| **Maine** | | | F. P. Gilley | 31 Central St., Bangor |
| **Maryland** | | | E. L. Pessagno, Jr. | 415 Medical Arts Bldg., Baltimore 1 |
| **Massachusetts** | | | H. E. Tingley | 12 Bay State Road, Boston |
| **Michigan** | April 16-18, 1951 | Detroit | F. Wertheimer | Michigan Dept. of Health, Lansing |
| **Minnesota** | Feb. 19-21, 1951 | Minneapolis | C. V. E. Cassel | 242 Lowry Medical Arts Bldg., St. Paul |
| **Mississippi** | | | F. C. Sneed | Osyka |
| **Missouri** | | St. Louis | R. R. Rhoades | 201 Merchants Bank Bldg., Jefferson City |
| **Montana** | May 3-5, 1951 | Billings | C. S. Renouard | 304 Phoenix Bldg., Butte |
| **Nebraska** | May 14-16, 1951 | Lincoln | F. A. Pierson | Federal Securities Bldg., Lincoln |
| **Nevada** | | | C. A. Paice | Boggs Bldg., Las Vegas |
| **New Hampshire** | | | F. E. Williams | 814 Elm St., Manchester |
| **New Jersey** | | | J. G. Carr | 407 Cooper St., Camden |
| **New Mexico** | | | J. S. Eilar | First National Bank Bldg., Albuquerque |
| **New York** | | | C. A. Wilkie | 1 Hanson Place, Brooklyn |
| **North Carolina** | April 30-May 2, 1951 | Pinehurst | Bernard N. Walker | Liberty Life Bldg., Charlotte |
| **North Dakota** | | | J. H. Lunday | Fargo |
| **Ohio** | Nov. 27-29 | Cincinnati | E. G. Jones | 185 E. State St., Columbus |
| **Oklahoma** | April 15-18, 1951 | Oklahoma City | R. C. Calkin | 109½ W. Oklahoma, Guthrie |
| **Oregon** | | | H. C. Fixott, Jr. | Medical-Dental Bldg., Portland |
| **Panama Canal Zone** | | | L. F. Baranowski | P. O. Box 102, Ft. Kobbe |
| **Pennsylvania** | | | M. D. Zimmerman | 217 State St., Harrisburg |
| **Puerto Rico** | July 16-17 | | J. F. Suarez | Box 3863, Santurce |
| **Rhode Island** | Jan. 1951 | Providence | A. F. Sullivan | 171 Westminster St., Providence 3 |
| **South Carolina** | | | J. R. Owings | 201 E. North St., Greenville |
| **South Dakota** | May 20-22, 1951 | Watertown | E. W. Elmen | Sioux Falls |
| **Tennessee** | May 7-9, 1951 | Nashville | E. J. Justis | Exchange Bldg., Memphis |

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| **Texas** | Apr. 30-May 3, 1951 | San Antonio | W. Ogle | 310 N. Ervay St., Dallas |
| **Utah** | | | B. F. McBride | Medical Arts Bldg., Salt Lake City |
| **Vermont** | | | J. A. Larrow | Middlebury |
| **Virginia** | April 9-11, 1951 | Richmond | J. E. John | 804 Medical Arts Bldg., Roanoke |
| **Washington** | | | C. E. Flood | 1130 Medical-Dental Bldg., Seattle 1 |
| **West Virginia** | June 16-18, 1951 | White Sulphur Springs | A. B. Drake | 1202 West Virginia Bldg., Huntington |
| **Wisconsin** | Mar 27-29, 1951 | Milwaukee | R. A. Mason | 964 N. 27th St., Milwaukee |
| **Wyoming** | | | T. A. Ward | 326 Wyoming National Bank Bldg., Casper |

## MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| **Alabama** | | | M. D. Edwards | 120 Adams, Montgomery |
| **Alaska** | Aug. 28 | Juneau | J. H. Geyer | Juneau |
| **Arizona** | | | R. K. Trueblood | 25 N. Second Ave., Glendale |
| **Arkansas** | | | H. E. Hanna | Wilson Bldg., El Dorado |
| **California** | July 24 | San Francisco | K. I. Nesbitt | 507 Polk St., San Francisco 2 |
| **Colorado** | | | W. D. McCarthy | 724 Republic Bldg., Denver 2 |
| **Connecticut** | | | C. G. Brooks Recorder | 302 State St., New London |
| **Delaware** | | | P. K. Musselman | 143 W. Main St., Newark |
| **District of Columbia** | | | J. R. Palkin | 1835 Eye St., N. W., Washington |
| **Florida** | July 10-15* | Jacksonville | A. W. Kellner | P. O. Box 155, Hollywood |
| **Georgia** | | | R. C. Coleman | State Capitol Bldg., Atlanta 3 |
| **Hawaii** | Aug. 30-Sept. 4* | Honolulu | H. L. Houvener | 7-8 Pantheon Bldg., Honolulu |
| **Idaho** | Aug. 1 | Boise | F. L. Luce | 510 First National Bank Bldg., Boise |
| **Illinois** | | | W. A. McKee | 503 Wood Bldg., Benton |
| **Indiana** | | | C. A. Frech | Gary National Bank Bldg., Gary |
| **Iowa** | | | H. M. Willits | 719 Roshek Bldg., Dubuque |
| **Kansas** | | | G. L. Teall | Hiawatha |
| **Kentucky** | | | R. I. Todd | Western Union Bldg., Richmond |
| **Louisiana** | | | A. R. deNux | Marksville |
| **Maine** | | | R. A. Derbyshire | Box 387, Skowhegan |
| **Maryland** | | | W. D. Day | 3811 Hadley Square E., Baltimore 18 |
| **Massachusetts** | | | J. C. Wilson | 413 N. State House, Boston 33 |
| **Michigan** | | | J. L. Champagne | 3714 W. McNichols Road, Detroit 21 |
| **Minnesota** | | | F. A. Larson | 1632 Washington St., N. E., Minneapolis |
| **Mississippi** | | | J. C. Boswell | 508 Lamar Bldg., Jackson |
| **Missouri** | | | R. R. Rhoades | Central Trust Bldg., Jefferson City |
| **Montana** | July 10-13 | Helena | T. C. Betzner | 301 Power Bldg., Helena |
| **Nebraska** | | | C. A. Bumstead | 924 Stewart Bldg., Lincoln |
| **Nevada** | Dec. 4 | Reno | G. C. Steinmiller | Masonic Temple, Reno |
| **New Hampshire** | | | J. B. Brown | 5 N. State St., Concord |
| **New Jersey** | | | W. A. Wilson | 150 E. State St., Trenton 8 |
| **New Mexico** | | | J. J. Clarke, Sr. | Artesia |
| **New York** | Sept. 29-30§† | New York and Buffalo | D. W. Beier | 23 S. Pearl St., Albany 7 |
| | Oct. 3-6**† | New York, Buffalo, Syracuse and Albany | | |
| | Sept. 30§‡ | New York and Buffalo | | |
| | Oct 3-4**‡ | New York and Buffalo | | |
| **North Carolina** | | | F. O. Alford | 1109 Liberty Life Bldg., Charlotte 2 |
| **North Dakota** | July 9-13* | Fargo | W. J. Ford | Fargo |
| **Ohio** | June 26-July 1 | Columbus | E. D. Lowry | 79 E. State St., Columbus |
| **Oklahoma** | | | N. D. Griffith | 509 Medical Arts Bldg., Oklahoma City 2 |

| State | Date | Place | Secretary | Address |
|---|---|---|---|---|
| **Oregon** | | | A. F. Davis<br>Exec. Secy. | 306 Public Service Bldg.,<br>Portland |
| **Pennsylvania** | | | R. E. V. Miller | Northampton National<br>Bank Bldg., Easton |
| **Rhode Island** | | | F. M. Hackett | State Office Bldg.,<br>Providence |
| **South Carolina** | July 6-8 | Columbia | E. G. Bumgardner | 1517 Hampton St.,<br>Columbia |
| **South Dakota** | | | R. W. Ellis | Salem |
| **Tennessee** | | | F. S. Maxey | 804 Bennie Dillon Bldg.,<br>Nashville 3 |
| **Texas** | | | R. T. Weber | 312 Capital National Bank<br>Bldg., Austin |
| **Utah** | | | J. J. Dalpiaz | Helper |
| **Vermont** | | | F. A. Reid | Windsor |
| **Virginia** | | | J. M. Hughes | 715 Medical Arts Bldg.,<br>Richmond 19 |
| **Washington** | | | J. B. Kiefer, Jr. | 510 Cobb Bldg., Seattle |
| **West Virginia** | | | C. R. Singleton | 535 Medical Arts Bldg.,<br>Charleston 1 |
| **Wisconsin** | | | S. F. Donovan | Tomah |
| **Wyoming** | | | W. J. Ryan | 208 Boyd Bldg., Cheyenne |

*Dentistry and dental hygiene.
†Dentistry.
‡Dental hygiene.

§Practical examinations.
**Written examinations.

## OTHER MEETINGS

| Name | Date | City | Secy. or Chm. | Address |
|---|---|---|---|---|
| **American Association of Dental Examiners** | Oct. 27-28 | Atlantic City, N. J. | C. A. Bumstead<br>Secy. | 924 Stuart Bldg.,<br>Lincoln, Neb. |
| **American Dental Assistants Association** | Oct. 30-Nov. 2* | Atlantic City, N. J. | M. L. Martin<br>Exec. Secy. | 410 First National Bank<br>Bldg., LaPorte, Ind. |
| **American Dental Society of Europe** | July 19-22 | Amsterdam, Holland | F. D. Derrick | 140 Park Lane,<br>London, W. 1. |
| **American Society for the Advancement of General Anesthesia in Dentistry** | Oct. 23 | New York | M. H. Feldman<br>Exec. Secy. | 730 Fifth Ave.,<br>New York |
| **American Society of Dentistry for Children** | Oct. 27-29 | Atlantic City, N. J. | G. Tank<br>Chm. | 339 Ashbourne Road,<br>Elkins Park 17, Pa. |
| **American Society of Oral Surgeons, Thirty-Second Annual Meeting** | Oct. 25-28 | Atlantic City, N. J. | H. Bear<br>Secy. | 1112 East Clay St.,<br>Richmond 19, Va. |
| **Greater New York Dental Meeting** | Dec. 4-8 | New York | A. E. Corby<br>Chm. Press<br>Publication | Room 106A, Hotel Statler,<br>New York 1 |
| **International Dental Federation** | July 23-30 | Paris, France | M. F. Watry<br>Secy. | 35, rue Souveraine,<br>Brussels, Belgium |
| **Italian Medico-Dental Association, Twenty-Fifth Annual Convention on Stomatology** | Sept. 26-30 | Stresa (Lake Maggiore) | Enrico Goia | Via Lamarmora, 9,<br>Torino, Italy |
| **Mid-Continent Dental Congress, Tenth Annual Meeting** | Nov. 26-29 | St. Louis | J. E. Brophy<br>Exec. Secy. | 927 Syndicate Trust Bldg.,<br>St. Louis 1 |
| **New England Dental Society, Annual Meeting** | Oct. 4-5 | Boston | A. R. Wilson<br>Secy. | 43 Farmington Ave.,<br>Hartford, Conn. |
| **New Orleans Dental Conference** | Nov. 5-8 | New Orleans | M. R. Matta<br>Secy. | 8117 Oak St.,<br>New Orleans |
| **Northeastern Society of Orthodontists, Annual Meeting** | Nov. 6-7 | Washington, D. C. | O. Jacobson<br>Secy. | 35 W. 81st St.,<br>New York |
| **Odontological Society of Western Pennsylvania** | Nov. 14-16 | Pittsburgh | W. E. Craig<br>Secy. | 206 Jenkins Bldg.,<br>Pittsburgh 22 |

*Examination for Certification.

Come into the libraries of dental schools overseas . . . you'll find that war and poverty made them mockeries . . . a few charred books—some a quarter of a century old . . . and that's all.

Years behind in techniques . . .

Whole new fields unknown . . .

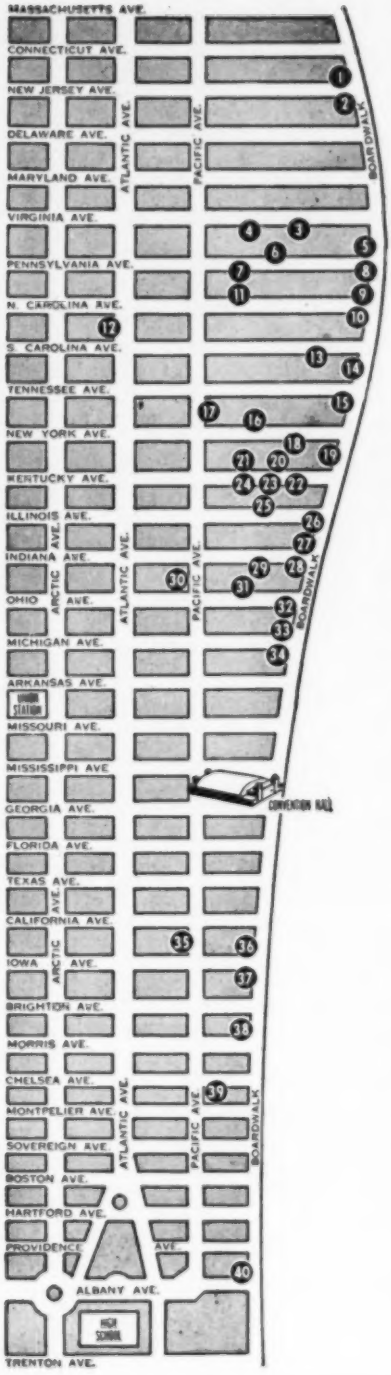
New techniques that we could tell them about . . .

Help through your A. D. A. fund providing new dental books . . . the latest and best technical books for dental institutions overseas . . . sent through CARE.

Won't you help? Send your contribution in any amount to

**ADA BOOK FUND**

222 East Superior Street, Chicago 11, Illinois




# *Atlantic City*

## HOTELS

| Key No. | HOTELS | Single | Double | Suites |
|---|---|---|---|---|
| 37 | Ambassador | 6.00 - 11.00 | 9.00 - 14.00 | 20.00 - 26.00 |
| 19 | Apollo | 4.00 - 6.00 | 6.00 - 10.00 | |
| 21 | Boscobel | 3.00 - 4.00 | 6.00 - 7.00 | |
| 1 | Breakers | 5.00 - 9.00 | 7.00 - 14.00 | |
| 27 | Brighton | 6.00 - 10.00 | 8.00 - 14.00 | 18.00 - 28.00 |
| 9-10 | Chalfonte-Haddon Hall | 6.00 - 10.00 | 8.00 - 18.00 | 20.00 - 34.00 |
| 38 | Chelsea | 5.25 - 6.75 | 6.75 - 15.00 | 21.00 - 28.50 |
| 4 | Clarendon | 5.00 - 6.00 | 7.00 | |
| 28 | Claridge | 6.00 - 14.00 | 9.00 - 17.00 | 30.00 - 31.00 |
| 7 | Colton Manor | 5.00 - 9.00 | 7.00 - 12.00 | |
| 17 | Columbus | | 6.00 | |
| 29 | Crillon ★ | | 8.00 - 10.00 | |
| 33 | Dennis | 6.00 - 8.00 | 9.00 - 16.00 | 27.00 |
| 30 | Eastbourne | | 7.50 - 8.00 | |
| 16 | Flanders | 5.00 | 7.00 - 9.00 | |
| 35 | Fox Manor | 5.00 - 8.00 | 6.00 - 10.00 | |
| 6 | Holmhurst | | 7.00 - 8.00 | |
| 23 | Jefferson | 6.00 | 7.00 - 10.00 | |
| 24 | Kentucky | 3.50 | 6.00 - 7.00 | |
| 11 | Lafayette | 5.00 - 6.00 | 8.00 - 10.00 | |
| 18 | Lexington | 6.00 | 6.50 - 8.50 | |
| 25 | Madison | 4.50 - 6.00 | 7.00 - 10.00 | |
| 32 | Marlborough-Blenheim | 6.00 - 10.00 | 9.00 - 16.00 | 27.00 - 36.00 |
| 15 | Mayflower | 5.00 - 6.00 | 7.00 - 12.00 | |
| 20 | Monticello | | 7.00 | |
| 3 | Morton | 5.00 - 7.00 | 7.00 - 10.00 | |
| 14 | New Belmont | 4.00 - 5.00 | 6.00 - 10.00 | |
| 12 | Penn-Atlantic | | 7.00 | |
| 40 | President | 5.00 - 10.00 | 8.00 - 14.00 | 13.00 - 24.00 |
| 36 | Ritz-Carlton | 6.00 - 12.00 | 8.00 - 14.00 | 30.00 |
| 31 | Runnymede | 4.00 - 7.50 | 6.00 - 10.00 | |
| 2 | St. Charles | 5.00 - 12.00 | 7.00 - 14.00 | |
| 5 | Seaside | 5.00 - 9.00 | 8.00 - 12.00 | 26.00 |
| 13 | Senator | 4.50 - 7.00 | 7.00 - 12.00 | |
| 34 | Shelburne | 6.00 - 16.00 | 9.00 - 18.00 | |
| 22 | Sterling | 4.00 - 5.00 | 6.00 - 7.00 | |
| 8 | Strand | 4.50 - 6.00 | 9.00 - 12.00 | |
| 26 | Traymore | 6.00 - 14.00 | 8.00 - 18.00 | 16.00 - 40.00 |
| 39 | Villa D'Este | 5.00 - 6.00 | 8.00 - 9.00 | |

★Rate includes Breakfast. The above rates are subject to 3% Municipal Tax.

Atlantic City's streets are 13 blocks to the mile instead of the usual 8.

# Hotel Reservation Application . . .

*91st Annual Session—*
*American Dental Association*
*October 30—November 2, 1950*
*Atlantic City, New Jersey*

## A. D. A. HOUSING BUREAU

16 Central Pier, Atlantic City, New Jersey

### *INSTRUCTIONS:*

Reservations for hotel accommodations may be secured by completing this application blank and mailing it to: *A.D.A. Housing Bureau,* 16 Central Pier, Atlantic City, New Jersey. List four choices of hotels. You will receive confirmation direct from the hotel accepting the reservation. If any difficulty arises with the reservation, write immediately to the A.D.A. Housing Bureau at Atlantic City.

A.D.A.

***Applicant:***

Name_____

_____
(Street address) (City) (Zone) (State)

Arrival in Atlantic City_____ a.m. p.m. Leaving_____

***Accommodations:***

Hotel_____ (First choice) Hotel_____ (Third choice)

Hotel_____ (Second choice) Hotel_____ (Fourth choice)

☐ Single occupancy, rate to range from $_____ to $_____ per day.

☐ Double occupancy, double bed, rate to range from $_____ to $_____ per day.

☐ Double occupancy, twin beds, rate to range from $_____ to $_____ per day.

☐ Suite of _____ rooms, including parlor, rate to range from $_____ to $_____ per day.

***Occupants:*** (use extra sheets for additional names)

Rooms will be occupied by:

_____
(Name) (Address) (City) (State)

_____
(Name) (Address) (City) (State)

Picture your patient as his Durallium partial goes comfortably into place . . . his smile signals a new, brighter outlook on life.

***you'll smile, too!***

. . . at your pleasing results . . . and at the thought that Durallium will function well for years and years to come

*Write for details on Durallium . . . or ask your Durallium laboratory*

durallium

**products corp.**

809 WEST WASHINGTON BLVD.
CHICAGO 7, ILLINOIS

# Now Available!

# A POST-PAYMENT PLAN for Your Patients!

**Your Practice can be increased by offering complete dental care to the budgeting family**

1. We purchase your patient's note and pay you CASH, NOW!
2. An ethical plan, easy, convenient and pleasant for both doctor and patient.
3. All forms and service FREE for doctor.
4. FREE insurance feature protects patient and doctor.
5. Annual CPA audit given to doctor.
6. Based on fundamental principles of economics:
   (a) Individually planned for each doctor—no grouping.
   (b) Encourages cash—but permits time payments.
   (c) Permits complete dental care at once.
7. A proven plan now in use.

## Reserve Plan Inc

TRADE MARK

**922 Walnut Street** **Kansas City 6, Missouri**

**ASSETS OVER $1,000,000.00**

***For complete information, mail coupon TODAY!***

**Reserve Plan Inc.**
**922 Walnut St.,**
**Kansas City 6, Mo.**

13-7

Please (call on me) (mail me information) about your plan for PURCHASING dental notes. The most convenient time to see me is between the hours of_____ and_____on the following days of the week_____.
No obligation to me, of course!

NAME _____

ADDRESS _____

CITY_____ STATE_____

## good laboratories

do their
best work
with
LUCITONE

Continuing improvements in laboratory technic . . . and in the performance of *Lucitone*, the denture material preferred by leading laboratories . . . are of tremendous value to the dental profession and to denture patients everywhere. In lifelike appearance, in tissue tolerance, and in dimensional stability, today's *Lucitone* dentures set new standards in prosthetic excellence.

*you're sure when you specify*

# LUCITONE

REG. U. S. PAT. OFF.

For modern materials call on *Caulk* Milford, Delaware

Lucitone is the trademark of the acrylic denture material manufactured specifically for dentistry from DuPont resins.

# KADON

# CLASSIFIED ADVERTISING

Forms close on 25th of second month preceding month of issue

Remittance Must Accompany Classified Ads.

Advertisements cost $3.50 not exceeding 30 words, additional words 10c each. Commercial agency advertisements, $3.50 for 20 words, additional words 13c each. Publisher reserves the right to determine classification. An extra fee of 25c is charged advertisers who have answers sent care of A.D.A. and in such cases we do not furnish name or address to inquirers. This rate applies for each insertion.

## PRACTICES FOR SALE

FOR SALE—Home and two-chair office, late dentist. Established nine years. Beautiful residential location, corner landscaped plot 100 x 100, hot water oil heat. Hardwood floors, venetian blinds throughout. Wood burning fireplace. Youngstown kitchen, tiled baths, frigidaires. Screened terrace overlooking garden. Garage. Convenient to schools, churches, shopping. Two blocks RR station, 30 minutes to New York City. Income from apartment on premises. Priced $22,000. H. Lane, 223-15 139th Avenue, Laurelton, L. I.

●

FOR SALE—Very modern, attractive and complete dental office in wealthy residential district of Minneapolis. Fast growing residentially and commercially. Leaving because of health. Address A.D.A. Box 124.

●

FOR SALE—Substantial ten-room home, Eastern Long Island, 2½ baths, automatic heat, slate roof, double garage; eight-room bungalow office, two chairs, Ritter equipped, long established. Suitable terms. Consider experienced associate. Address A.D.A. Box 139.

●

FOR SALE—Complete two-chair dental office or any part of office equipment. Located Wintersville, Ohio. G. E. x-ray, new White J-unit and motor chair, old Trident unit and chair. Address replies to Dr. Warren Elliott, Cincinnati General Hospital, Cincinnati, Ohio.

●

FOR SALE—Well established, general active practice, large Massachusetts city. Central location. Reason for selling: retirement. Address A.D.A. Box 153.

●

FOR SALE—Complete modern office and practice in northern Westchester County, New York. Dentist beginning graduate study of Orthodontics in September. Will assist in every way to introduce successor. Address A.D.A. Box 159.

●

FOR SALE—Practice and equipment occupying all of three room bungalow near Kingston, N. Y. Very reasonably priced for immediate sale. Write Dr. Paul Foxman, 126 Third St., Newburgh, N. Y.

●

FOR SALE—Dayton, Ohio. Fully equipped office located on main artery. Rapidly growing, prosperous city. Four rooms first floor. Very reasonable, good fees, low rent. Write Dr. Murphy, 2900 Athens, Dayton, Ohio.

●

FOR SALE—Modern office and well established practice. Ritter equipment. Excellent location in city within 70 miles of New York City. Address A.D.A. Box 164.

## LOCATIONS AVAILABLE

FOR RENT—Miami, Florida. Completely equipped operating room in new air-conditioned bungalow office on Venetian Causeway. Lessee will have use of laboratory, dark room, secretary's office, etc. Address A.D.A. Box 156.

●

FOR RENT—Four room suite, desirable location for dentist. Joseph Halton Hospital Building, Sarasota, Florida. Address replies to Joseph Halton, M.D.

## OPPORTUNITIES AVAILABLE

WANTED—By philanthropic foundation, dentists under 40 years of age for public health work. Starting salary rate, $4,500.00 per annum. Michigan licensure not required provided the individual is a graduate of an accredited dental school and is licensed in another state. For detailed information write Kenneth R. Gibson, D.D.S., M.S.P.H., Director, Child Health Division, Children's Fund of Michigan, 660 Frederick Street, Detroit 2, Michigan.

●

WANTED—Dentist to take over general practice in St. Louis, Missouri, starting September, 1950, for period of fifteen months. Owner undertaking graduate work in Orthodontia. No investment required. State qualifications. Address A.D.A. Box 160.

●

STATE UNIVERSITY in process of organizing a Dental School. Appointments to the faculty are available in all departments. Letters of inquiry should contain the following information: age, nationality, school, degrees and teaching experience. For complete information, address A.D.A. Box 161.

●

WANTED—Young dentist at Ringsted, Iowa, population 600, trade territory of 2,000. New brick office building, share with young physician. Good hunting and fishing. Write J. W. Crossley, M.D., Ringsted, Iowa.

●

WANTED—Dentist, in fast growing Texas Gulf Coast town of 3500 population. Office space available in new Hospital-Clinic building. Good hunting and fishing the year round, with summer and winter tourist trade. For details, write Rockport Hospital, Rockport, Texas.

## OPPORTUNITIES WANTED

EXODONTIST—alert and personable with long experience wants association in New York City a few days a week. Compensation incidental to future opportunity. Address A.D.A. Box 141.

●

DENTIST—B.S., D.D.S., M.S., in general pathology will consider teaching oral pathology and diagnosis; research; hospital appointment; association in general practice. Address A.D.A. Box 162.

DENTAL ASSISTANT—seeks position in Chicago, Arizona or Colorado. 3 years college, 1 year's experience. Can do lab work and take x-rays. Address A.D.A. Box 165.

## EQUIPMENT FOR SALE

FOR SALE—in Florida. S. S. White automatic operating chair, Master Unit A. Castle light, Pelton sterilizer, air compressor and full laboratory equipment. Price very reasonable. Reason: Owner's death. Address A.D.A. Box 163.

FOR SALE—Complete one chair office set-up, cream white color. Includes a No. 5 Weber x-ray and some lab equipment. A good buy. Contact Dr. F. E. Ketola, Morrison, Ill.

## MISCELLANEOUS

WANTED—Old Dental Books—Orthodontia Journals; Old Dental Prints—Advertisements. Leo L. Bruder, 1 DeKalb Avenue, Brooklyn 1, N. Y.

---

**Ann Woodward, Director**
**Woodward Medical Personnel Bureau**
**185 N. Wabash Avenue**
**Chicago 1, Illinois**

## OPPORTUNITIES AVAILABLE

D-153—ORAL SURGEON: to associate with well established Chicago Dentist. Must be certified or eligible, under 45. Wonderful practice—Dr. contemplating retirement few years. Attractive financial arrangement.

•

D-252—LOCATION for Dentist: Small privately owned Hospital. Excellent Western resort area. Estimate $15,000 income—more if qualified in dental surgery.

•

D-166—GENERAL DENTIST: associate established Texas practice. Salary about $8,000 first year; percentage 2nd. year-potential $12,000 to $14,000.

•

D-150—DENTIST: young, to associate with established man in nice residential community near Midwest Metropolis. Salary to start, partnership later. Some experience—not over 35.

•

D-167—INDUSTRIAL DENTIST: Large corporation, Michigan, $7,500. Good working conditions—paid vacation.

•

D-138—ORTHODONTIST: Establish individual practice: new clinic building with laboratory facilities. Rapidly growing industrial, farming Westcoast community near university metropolis.

•

D-168—PEDODONTIST: partnership offer with expanding medical group. Pacific Northwest. Potential income $10,000 first year.

•

D-1150—SPACE available for dentist in Florida Medical Center: private practice. Beautiful building, all facilities—parking area etc.

D-154—ORAL SURGEON: exceptional opportunity for young man to take over $30,000 a year practice. Large Midwestern City.

•

D-140—UNOPPOSED LOCATION: Community in urgent need of a dentist, will cooperate in every way to get a young man established. Northwest.

•

D-147—DENTIST: Rapidly developing Southwest Medical Center, all fields of medicine and dentistry covered. 9 dentist Staff: good salary, paid vacation.

•

D-122—LOCATION: for Dentist in California Medical Center. Modern building with 15 Physicians including one dentist at present. Many advantages.

•

D-134—DENTIST: Young, to complete staff of Midwestern Medical Group, near university center. Salary and partnership in one year.

## OPPORTUNITIES WANTED

Young Dentist wants association, Group Clinic opportunity in Exodontia, Oral Surgery, or General dentistry: D.D.S Temple University, Residency in Oral Surgery. Release from Navy July.

•

Dentist: D.D.S. Columbia, Law Degree, 20 years' experience in general dentistry, Orthodontia, Root Therapy, Endodontia, Surgical Prosthesis, Color Technology, Research, Author and Lecturer: Wants industrial or institutional opportunity in research or administrative field, or any good offer.

•

Oral Surgeon: Age 27, D.D.S. State University, internship and residency, P.G. Oral Surgery; wants assistantship, partnership, or group clinic.

---

**Burneice Larson, Director**
**The Medical Bureau**
**Palmolive Building**
**Chicago 1, Illinois**

## OPPORTUNITIES AVAILABLE

(a) Dentists qualified in teaching for following departments: prosthetic dentistry, oral diagnosis, operative dentistry, crown and bridge prosthesis, children's dentistry.

•

(b) Dentist to become associated with dental department, industrial organization; vicinity Baltimore.

•

(c) Oral surgeon to become associated with oral surgeon well established in California.

(d) Dentist to take charge of dental clinic serving employees of large industrial company construction project; tropical island; $10,000 transportation plus 20% bonus upon completion year's contract.

•

(e) Dentist for full-time hospital position; substantial salary including complete maintenance for self and wife; New York.

•

(f) Orthodontist to become associated with orthodontist; Chicago.

## The Medical Bureau (cont'd)

(g) Pedodontist and general practitioner to become associated with small group expanding its facilities; California.

•

(h) Dentist qualified in teaching and interested in all phases of research in oral diseases; university appointment.

•

(i) Orthodontist to become associated with dentist well established in one of Wisconsin's leading cities.

•

(k) Associate by dentist long established general practice; Chicago.

•

(l) Associate; general practice; early partnership; Ohio.

•

(m) Dentist to become associated with school health department; opportunity for obtaining excellent training in children's and public health dentistry; 5-day week; duties those encountered in any well regulated private practice; excellently equipped department; Middle West.

•

(n) Orthodontist; group appointment; New Jersey.

•

(o) Dentist to become associated with two dentists, well established in one of South Dakota's leading cities; salary basis with opportunity of partnership later.

•

(p) General dentist and, also, pedodontists to join dental department, clinic and hospital; Southwest.

•

(q) Associate; general practice; town of 100,000, New York; $600.

•

(r) Pedodontist to become associated with several dentists engaged in general practice; Kansas.

•

(s) Associate; general practice; college town; Massachusetts; partnership.

•

(t) Michigan licensed dentist to take charge of three-chair dental department, group clinic.

•

(u) Director, dental health program; public schools; town of 100,000, South.

•

(v) Junior or senior dentist; state hospital; Southeast.

•

(w) Dentist for general practice; group association; $500, percentage later; Indiana.

•

(x) Pedodontist to become associated with dentist; university town, Midwest.

### PRACTICES FOR SALE

(a) Long established practice limited to oral surgery; Midwest metropolis.

•

(b) General practice; Westchester County, hour's drive from New York.

•

(c) General practice; Eastern Pennsylvania.

•

(d) Two young dentists or experienced older dentist to take over lucrative practice long established in Chicago.

### WANTED

(a) Dental hygienist; institutional position, New York state.

•

(b) Dental assistant; industrial company engaged in construction project; tropical islands; man required; $85-$90 weekly, bonus, transportation.

•

(c) Hygienist and, also, dental x-ray technician; dental department, group clinic and hospital; Southwest.

•

(d) Dental hygienists; field positions with public health departments.

•

(e) Dental hygienist to become associated with several dentists, California.

### OPPORTUNITIES WANTED

Dentist seeks appointment in general practice with emphasis on prosthodontia; D.D.S., Minnesota; year's dental internship, teaching hospital; held administrative appointment during World War II; several years, association with group clinic.

•

Dentist, D.D.S., Northwestern University Dental School, is available for opportunity in Pedodontics; training consists of year's graduate training and year's internship, children's dentistry.

•

Dentist with several years' experience on staff of state hospital is available for institutional appointment; three years' general practice; two years with mobile dental unit before accepting present position; in thirties.

•

Oral surgeon; B.S., D.M.D., state university; three-year fellowship in oral surgery for which he received M.S. degree (Dental Surgery); eligible for American Board, Oral Surgery, 1951.

•

Young dentist is available for institutional or public health position in West and Southwest; B.A., D.D.S., University of Texas; two years' public health experience.

•

WANTED—Teaching and research position in operative dentistry and crown and bridge; B.A., M.S., Ph.D., D.D.S., degrees (Major in Education); several years' experience in teaching chemistry to pre-medical and pre-dental students before entering dental school; five years' experience in teaching crown and bridge.

•

Dentist now completing graduate work in prosthetic dentistry leading to Master of Science degree; several years' successful private practice before specializing.

•

Dentist trained, experienced public relations; eight years' successful practice; teaching, writing experience, prefers position, administrative character involving public relations.

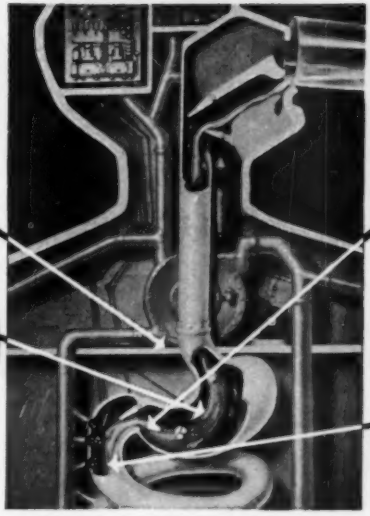
# Give faster pain relief with BUFFERIN

**ACTS TWICE AS FAST AS ASPIRIN**

**WITHOUT GASTRIC DISTRESS!**

**1.** BUFFERIN enters the stomach here.

**2.** BUFFERIN exerts its antacid effect, lessening the possibility of gastric distress.



**3.** BUFFERIN helps dilate the pyloric valve, promptly leaves the stomach.

**4.** BUFFERIN's analgesic component is absorbed into the blood *twice as fast as aspirin,* relieves pain.

When you prescribe BUFFERIN to your patients you assure *faster relief of pain.* Clinical studies[1] show that within ten minutes after BUFFERIN is ingested, blood salicylate levels are as great as those attained by aspirin in twice this time. That is why BUFFERIN *acts twice as fast as aspirin.*

BUFFERIN has *greater gastric tolerance.* BUFFERIN's antacid ingredients provide protection against the gastric distress so often seen with aspirin.[1] BUFFERIN, therefore, is especially suited for use when prolonged use of salicylates is indicated.

*1. Effect of Buffering Agents on Absorption of Acetylsalicylic Acid. J. Am. Pharm. A., Sc. Ed. 39:21, Jan. 1950.*

**In vials of 12 and 36 and bottles of 100. Scored for divided dosage. Each BUFFERIN tablet contains 5 grains of acetylsalicylic acid with optimal proportions of magnesium carbonate and aluminum glycinate.**

**BUFFERIN**
*is a trade-mark of the Bristol-Myers Company*

Accepted COUNCIL on DENTAL THERAPEUTICS AMERICAN DENTAL ASSOCIATION

*A product of* BRISTOL-MYERS COMPANY
19 West 50 St., New York 20, N. Y.

# Written and edited for you

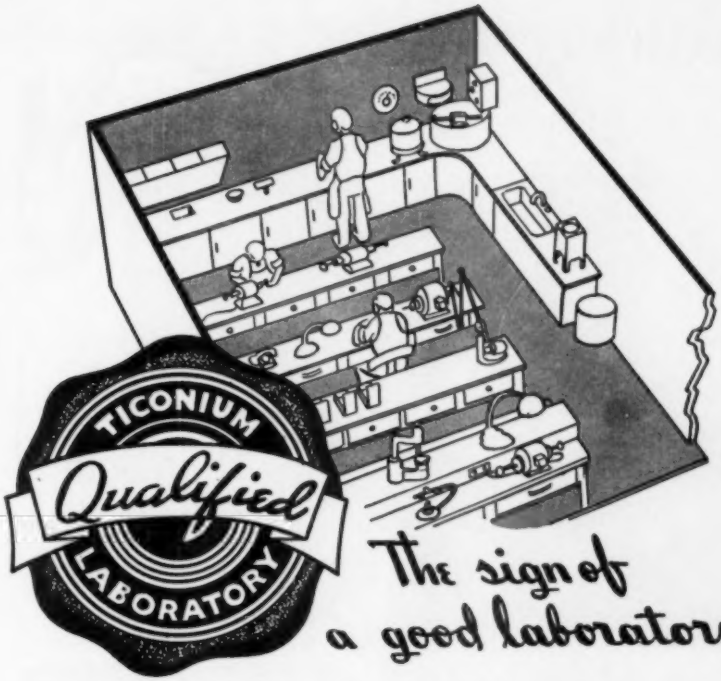
The JOURNAL of ORAL SURGERY is packed with practical articles for the general practitioner as well as the specialist. This informative, well-illustrated Quarterly is devoted to "the art and science of oral surgery," contains invaluable scientific articles, case reports, queries and comments, current literature, reviews and announcements.

Recently redesigned from cover to cover, it is inviting and easy to read. Edited by Reed O. Dingman, MD, DDS, and published by the American Dental Association *to meet your needs* and *to keep you posted* on all that is new in theory and practice. Have your subscription start with the current issue.

JOURNAL OF ORAL SURGERY

Send in your subscription today
Only $5 per year

American Dental Association
222 E. Superior St., Chicago 11, Ill.




# The sign of a good laboratory!

Your daily buying habits are influenced by well-known trade marks. The "Qualified Ticonium Laboratory" seal is your guide to a modern, efficient laboratory service, especially equipped to give you the finest in cast restorations. There's a Ticonium Laboratory near you.

on your next case... prescribe ..... **Ticonium**

413 N. Pearl Street ..... Albany 7, N. Y.

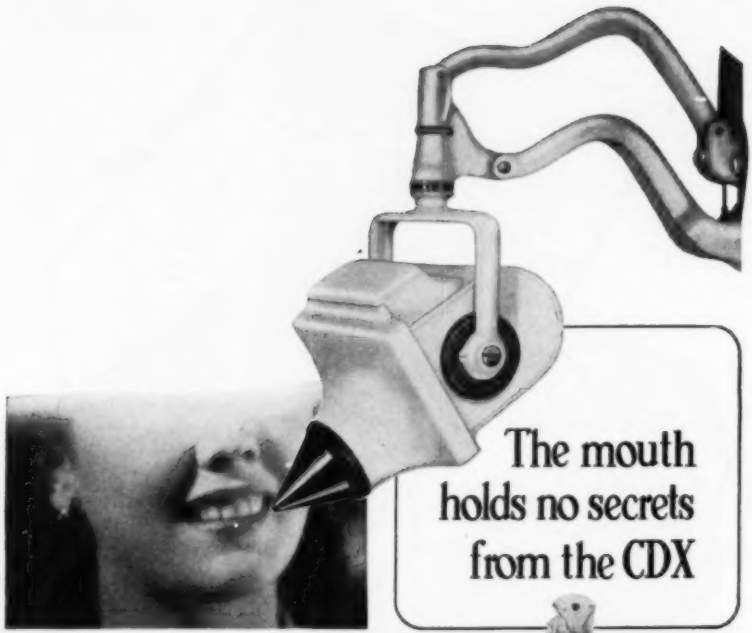
---

Please send name of the Ticonium Laboratory nearest to me.

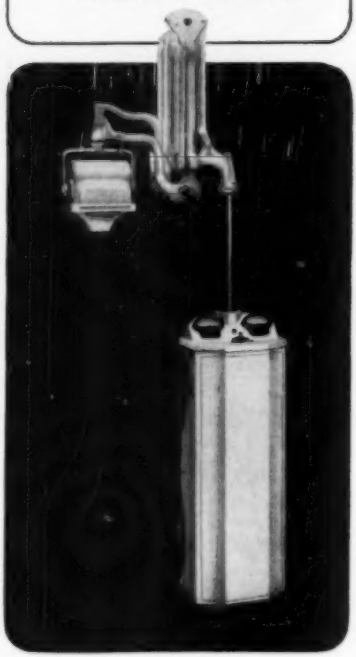
Name _____

Address _____

City_____ Zone_____ State_____



# The mouth holds no secrets from the CDX



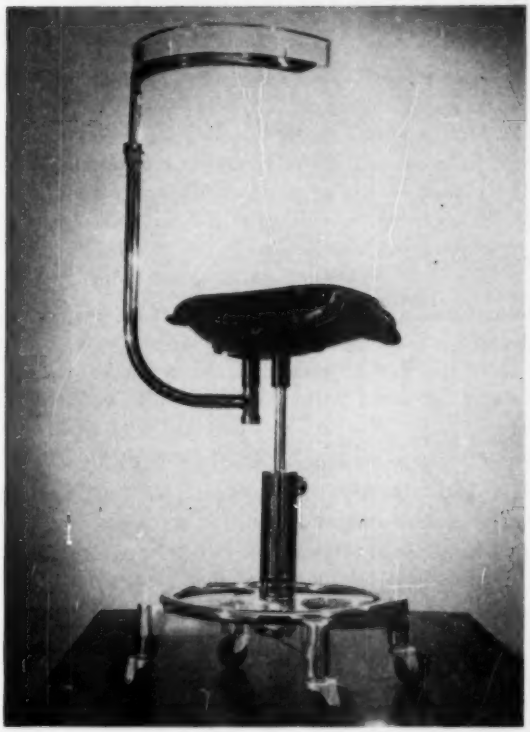
**Precise, clear detail is assured by small focal spot of Coolidge X-Ray Tube and exclusive Kearsley Stabilizer which holds tube current constant**

With a CDX your x-ray work is electrically safe, quick, authoritative! More than this, the tube head easily swings into place for the most difficult angulations . . . yet permits your patient to remain comfortably upright at all times. Permits you to obtain all diagnostic information while your patient is in your chair.

Ask your dealer to show you how the CDX can pay for itself — how its beautiful styling and scientific surety can *reflect your professional prestige!* If you prefer, write General Electric X-Ray Corporation, Dept. JJ-7 Milwaukee 14, Wisconsin.

GENERAL ELECTRIC
X-RAY CORPORATION

# The chair for the dentist



No doubt the advantages of operating in the seated position have been brought to your attention countless times. Perhaps the only single fact that keeps you from buying and using a chair or stool while practicing is that you have not found a chair that effectively relieves strain and tension.

Now — the Posture Comfort Chair has *all* the features and advantages you have been seeking. See for yourself the complete adaptability of the Posture Comfort Chair.

Write today for illustrated booklet — Childs Manufacturing Company, Macon, Georgia.

# RECENT ADDITIONS TO MOTION PICTURE LIBRARY OF AMERICAN DENTAL ASSOCIATION

**It's Your Health** (16 mm., sound, black and white, 18 min.). The importance of dental health is shown when a star halfback fails his Annapolis dental examination . . . urges and inspires both parent and child to assume the basic responsibility for dental health . . . for upper grade children, parents and teachers. Purchase, Southern California State Dental Association, 903 Crenshaw Blvd., Los Angeles 6, $75. Rent, American Dental Association, $2.50 per day, $4.50 per week.

**Your Child's First Visit to the Dentist** (16 mm., sound, black and white, 8 min.). Shows two types of conditioning to which a child may be subjected and the resultant behavior in each instance when the child meets up with the reality of dental care . . . for parents. American Dental Association, price—$35; rental—$2.50 per day, $4.50 per week.

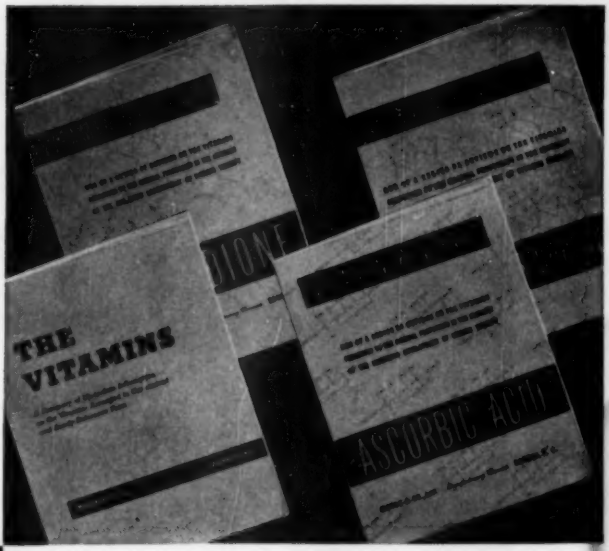
**Save Those Teeth** (16 mm., sound, black and white, 11 min.). Action centers around demonstrations made by Dr. Orfield to Dan, aged 11 . . . proper care involves four principal factors; (1) adequate brushing, (2) proper food, (3) restricted use of sugar, and (4) fluoride treatment . . . for school children, parents and teachers. Purchase, Encyclopaedia Britannica Films Inc., Wilmette, Ill., $50. Rent, American Dental Association, $2.50 per day, $4.50 per week.

**Dental Health: How and Why** (16 mm., sound, color, 10 min.). By means of a story about Jerry, 12 years old, and Susie, 6 years old, with their family and friends, the "how" and "why" are presented . . . explaining (1) adequate diet, (2) fluoride treatments, (3) daily dental care, and (4) the role of the dentist . . . for school children, parents and teachers. Purchase, Coronet Films, Chicago 1, color $90, black and white $45. Rent, American Dental Association, $2.50 per day, $4.50 per week.

**American Dental Association**
**222 East Superior Street**
**Chicago 11**

# Concise Vitamin Facts

From Merck & Co., Inc.
—where many of the
individual vitamins
were first synthesized.



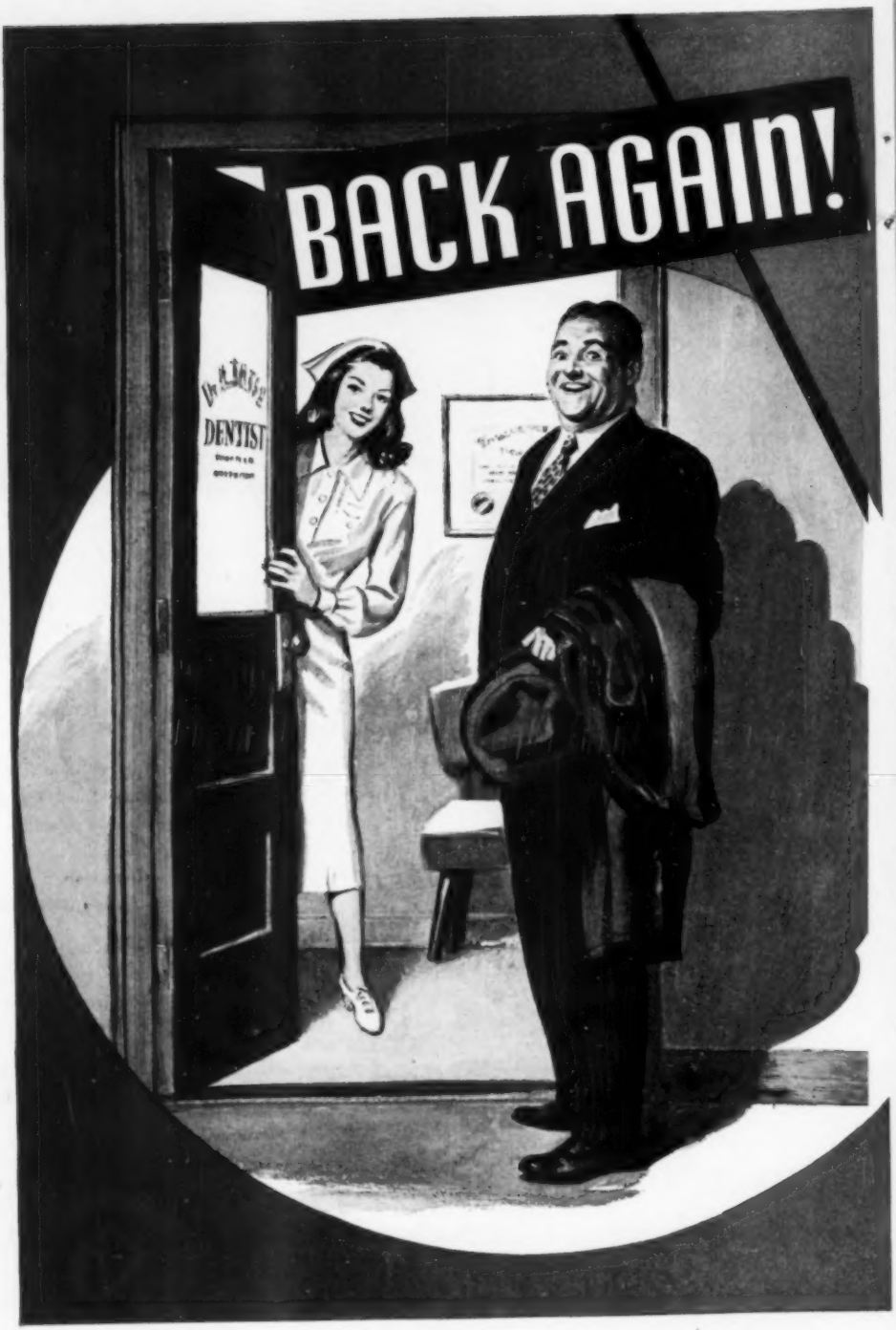
These six Merck *Vitamin Reviews* are yours for the asking while the editions last. These concise reviews contain up-to-date, authoritative facts and can be most useful for quick reference. Please address requests for copies to Merck & Co., Inc., Rahway, N. J.

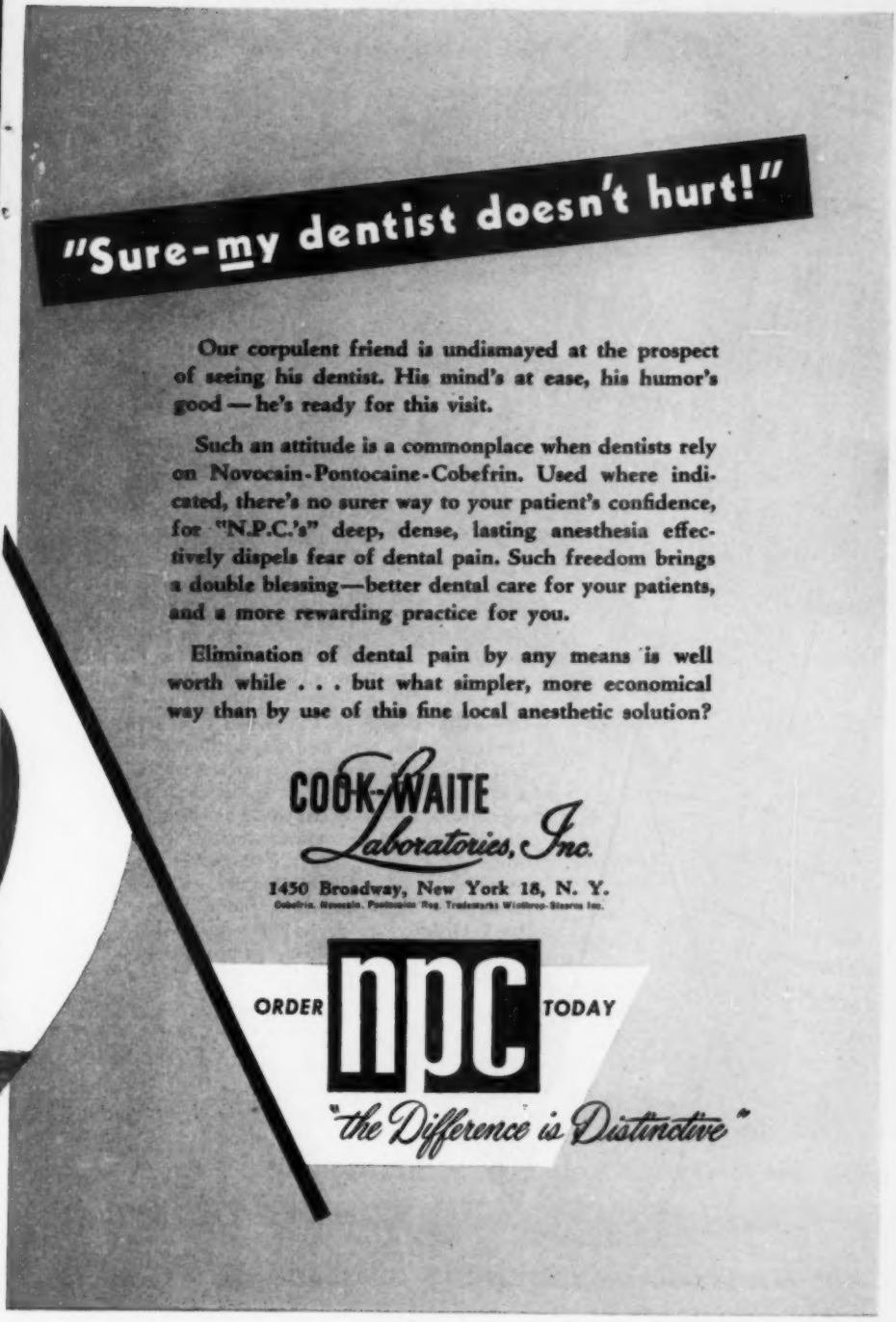
*Partial Index of Contents*

- Factors that produce avitaminosis.
- Signs and symptoms of deficiency.
- Daily requirements and dosages.
- Distribution in foods.
- Methods of administration.
- Clinical use in specific conditions.

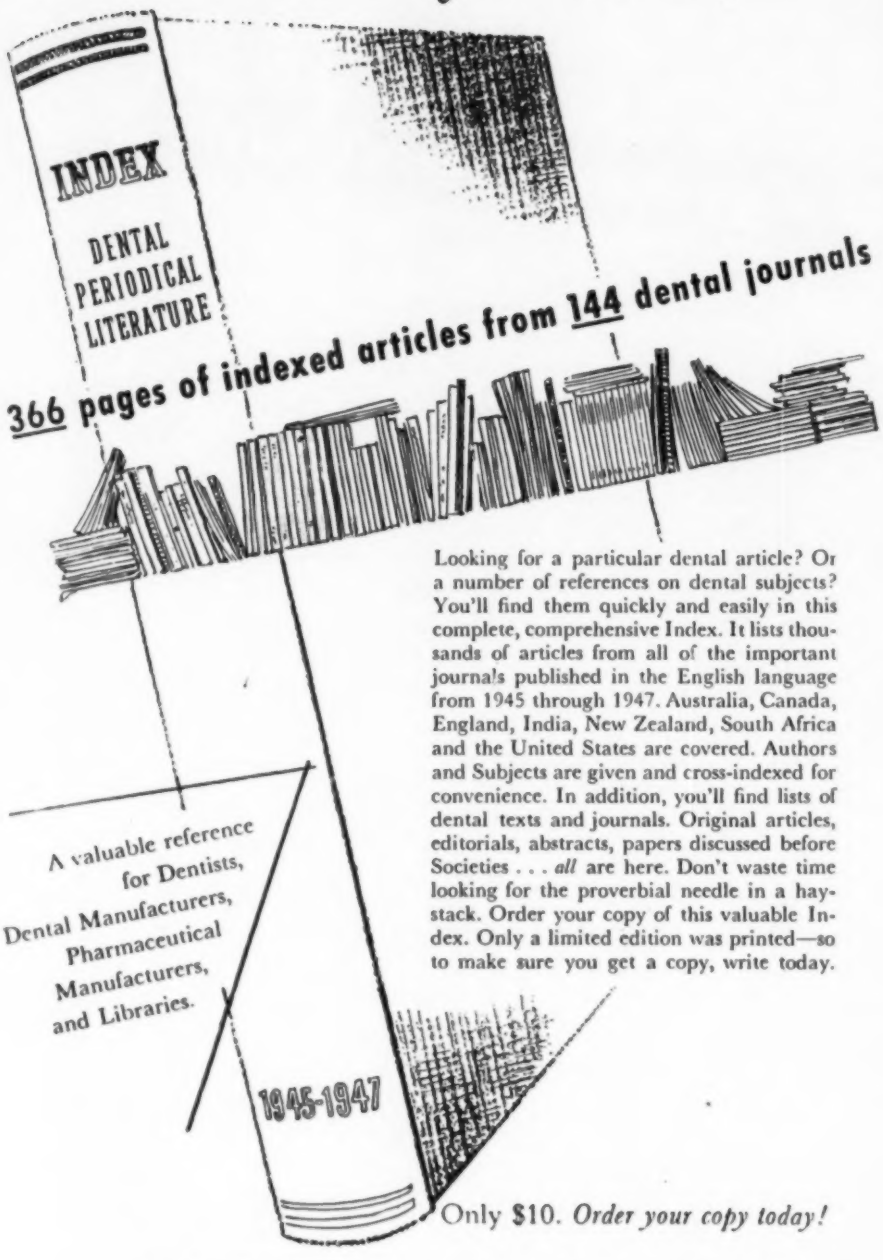
MERCK & CO., INC.
Manufacturing Chemists
RAHWAY, N. J.

MERCK VITAMINS are available under the labels of leading Pharmaceutical Manufacturers in appropriate pharmaceutical forms


BACK AGAIN!
DENTIST


"Sure-my dentist doesn't hurt!"
Our corpulent friend is undismayed at the prospect of seeing his dentist. His mind's at ease, his humor's good — he's ready for this visit.
Such an attitude is a commonplace when dentists rely on Novocain-Pontocaine-Cobefrin. Used where indicated, there's no surer way to your patient's confidence, for "N.P.C.'s" deep, dense, lasting anesthesia effectively dispels fear of dental pain. Such freedom brings a double blessing—better dental care for your patients, and a more rewarding practice for you.
Elimination of dental pain by any means is well worth while . . . but what simpler, more economical way than by use of this fine local anesthetic solution?
COOK-WAITE Laboratories, Inc.
1450 Broadway, New York 18, N. Y.
ORDER npc TODAY
"the Difference is Distinctive"

*Just off the press*




**366 pages of indexed articles from 144 dental journals**

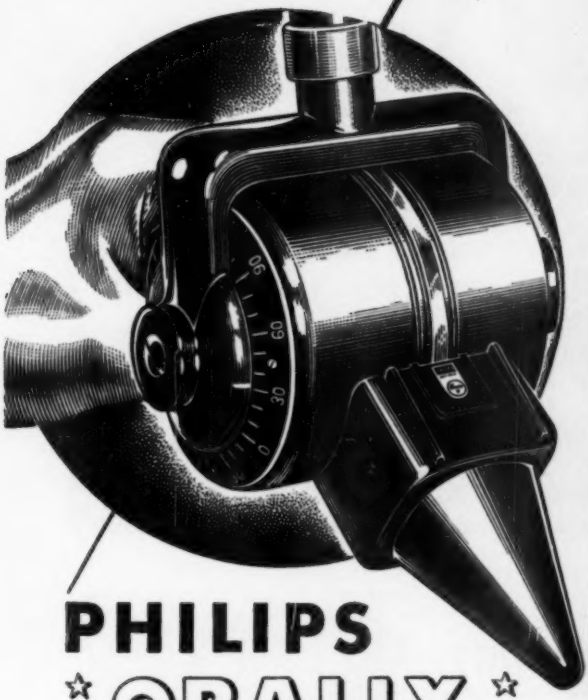
Looking for a particular dental article? Or a number of references on dental subjects? You'll find them quickly and easily in this complete, comprehensive Index. It lists thousands of articles from all of the important journals published in the English language from 1945 through 1947. Australia, Canada, England, India, New Zealand, South Africa and the United States are covered. Authors and Subjects are given and cross-indexed for convenience. In addition, you'll find lists of dental texts and journals. Original articles, editorials, abstracts, papers discussed before Societies . . . *all* are here. Don't waste time looking for the proverbial needle in a haystack. Order your copy of this valuable Index. Only a limited edition was printed—so to make sure you get a copy, write today.

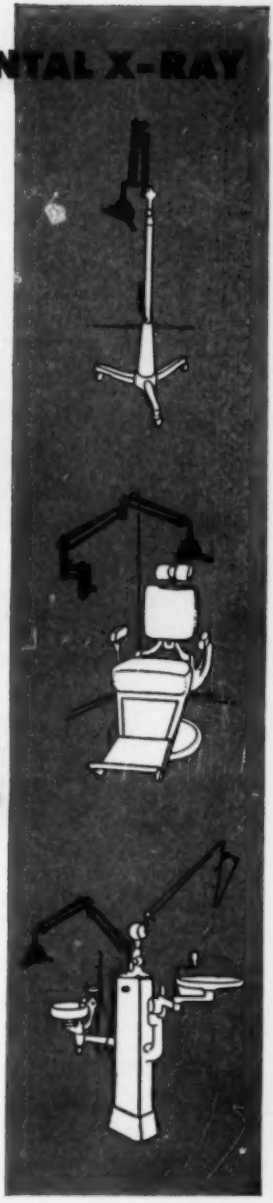
A valuable reference for Dentists, Dental Manufacturers, Pharmaceutical Manufacturers, and Libraries.

Only $10. *Order your copy today!*

American Dental Association, 222 East Superior Street, Chicago 11, Illinois

# *Revolutionary in* DENTAL X-RAY





## PHILIPS
## ☆ ORALIX ☆

**ORALIX**—the *newest* in dental X-ray equipment—is as *small* as your drill motor, as *flexible* as your wrist, and as dependable as it is compact.

**ORALIX**—is light in weight, yet *robust* in performance. Its miniature X-ray tube is revolutionary in design, and abundant in output. Its fine focus, effecting *pin-point* sharpness, produces radiographs *unmatched* for detail and definition.

For further information on the technical aspects and applications of this new dental X-ray achievement, write today for Bulletin 1007. It is yours without obligation.

*Foremost in X-ray progress since 1896*

**NORTH AMERICAN PHILIPS COMPANY, INC.**

Dept. ML-7, 730 S. FULTON AVENUE, MT. VERNON, N. Y. ★ IN CANADA: PHILIPS INDUSTRIES LTD., 1303 PHILIPS SQUARE, MONTREAL

EXPORT REPRESENTATIVE: PHILIPS EXPORT CORPORATION, 730 S. FULTON AVENUE, MT. VERNON, N. Y.

INDIAN HEAD

## CHILD'S SIZE COTTON ROLL HOLDERS

For use during Sodium Fluoride Treatments

| | |
|---|---|
| Children's Size | $ 5.00 |
| Adult Size | 5.00 |
| Child Size with Saliva Ejector | 10.00 |
| Adult Size with Saliva Ejector | 10.00 |

**Sold by Better Dealers Everywhere**

Manufactured by

**UNION BROACH CO., Inc.**

37 West 20th St. Dept. A-1 New York 11, N. Y.

## X-RAY PICTURES VISIBLE IN A JIFFY WITH INDIAN HEAD X-RAY REFLECTOR

Place reflector in the mouth, adjust your X-Ray, and there's your picture on the Reflector. Recommended for: root canal work, overhanging margins on fillings, impacted teeth, cysts, granulomas, fractured root tips, general examinations, etc.

1" — $5.00
1½" — $7.50
2" — $10.00

**UNION BROACH CO., INC. 37 West 20th St., New York 11, N. Y.**

## ARE YOU MOVING?

Giving us advance notice will keep the Journal coming to you without interruption. Here's a handy form to use:

Name .....

Old Address .....

.....

New Address .....

.....

MAIL TO

**American Dental Association**

222 E. Superior St.

Chicago 11, Illinois

MODEL V

*With Penta-Prism Eye Level Reflex Viewfinder in Position*

For Parallax-Free Dental Photography!

**1950 KINE EXAKTA—MODEL V**

**35 mm. Single Lens Reflex Camera**

For photographing conditions before and after treatment, cavities, inlays and bridgework, and for recording and for demonstrating oral treatment to patients. The indispensable aid of the progressive dentist! With f3.5 Zeiss Tessar "T" Coated Lens..... **$180.00***

| | |
|---|---|
| Penta Prism Eye Level Reflex Viewfinder | 60.00* |
| Extension Tube Set | 24.00 |
| Microscope Adapter | 24.00 |

*plus tax

**EXAKTA CAMERA COMPANY, Inc.**
**48 W. 29th St., New York 1, N. Y.**

*Exclusive Sales And Service Organization In U.S.A. For Ihagee Camera Works, Germany.*

MODEL V

Write Dept. 307 For Free Descriptive Booklet "V" on Camera & Accessories And Brochure On Close-Up Technique With Kine Exakta.

*With Waist-Level Reflex Viewfinder in Position*

Copyright 1950 Exakta Camera Company, Inc.

# . . . AUTOMATICALLY CONTROLLED STERILIZATION

*with the*

## RITTER DE LUXE HYDROMATIC *Sterilizer*

There's no reason to complicate your day, or your assistant's, with sterilizing worries. With the new Ritter "E-3" DeLuxe Hydromatic Sterilizer, your instruments are automatically sterilized. The new synchronous timer, set before or after placing instruments in the sterilizer, rigidly controls the actual sterilizing period. The timer operates *only* when the water reaches the boiling point.

Notice, too, these other *exclusive* features of the Ritter DeLuxe Hydromatic Sterilizer:

- AUTOMATIC WATER SUPPLY—fill the tank in the morning and forget it. Reservoir holds enough water for a full day's sterilization requirements.
- AUTOMATIC SAFETY SWITCH—latest float-type mercury safety switch. Operates automatically at low water level. Tank can't run dry. No danger of injury to instruments because of excessive dry heat.
- AUTOMATIC WATER LEVEL—water in sterilizing tank always at correct level. Instruments completely immersed at all times. No boiling over or boiling dry.
- AUTOMATIC PRE-CONDITIONING OF WATER—water is automatically heated to sterilization temperature before entering tank. Minerals present are deposited in pre-conditioner, minimizing mineral deposit in tank.

Visit your dealer for a demonstration of the new Ritter "E-3" DeLuxe Hydromatic Sterilizer.

*If you're vacationing in the East, be sure to visit our plant.*

**Ritter**
COMPANY INCORPORATED
BUILT UP TO A STANDARD NOT DOWN TO A PRICE
RITTER PARK, ROCHESTER 3, N.Y.

WRITE FOR YOUR COPIES OF THE REVISED
*Practice Builders*

THE
**SAFETY**
OF THE PATIENT
IS YOUR
**FIRST**
CONSIDERATION

## *Use Formula* 2ME

**The champion's glove crashing against his opponent's chin, is a potent weapon . . . *but far from safe!***

**IN LOCAL ANESTHESIA** too we must consider the relationship between safety and potency. A number of anesthetic drugs in excessive concentrations or combinations will produce deep anesthesia. So will cocaine. But all of these *"stronger"* anesthetics can induce toxic reaction and, in many instances, unpleasant post-operative sequellæ.

**MONOCAINE FORMULA 2ME** ***(Monócaine 2% with epinephrine 1:50,000)*** on the other hand, produces anesthesia as deep as Procaine 4% yet its toxicity is appreciably less than that concentration of Procaine.

**THE 2ME** solution will not produce parasthesia. It will not prolong the anesthesia unduly to discomfort the patient. 2ME is *Safer* than a 4% procaine or similar anesthetic.

SPECIFY
FORMULA
**2ME**
*Accepted*
COUNCIL on DENTAL THERAPEUTICS
AMERICAN DENTAL ASSOCIATION

Monócaine is the registered trade mark of Novocol Chemical Mfg. Co., Inc.

NOVOCOL CHEMICAL MFG. CO., INC.
201-23 Atlantic Ave. Brooklyn 17, N.Y.

—Cleans—Quickly, Efficiently

—Cool, Minty Flavor

—Leaves the Mouth Feeling Clean and Refreshed

—Recommended and Used for Years by Discriminating Dentists, all over the World

—Samples on request

WHITEHALL PHARMACAL COMPANY • 22 East 40th Street, New York 16, N. Y.

# S.S.WHITE Tarno

## *Factory proved.....*

## .....NON-

Practically all the popular types of S. S. White Extracting Forceps and Instruments are now available in the rustless, stainless, corrosion-resisting, hardenable, chromium steel, bearing our trade-mark "Tarno," and each is subjected to severe tests before leaving the factory to prove that it will not rust, even after repeated sterilizations.

You will find it more economical to purchase "Tarno" Instruments because they last longer than plated instruments, withstand sterilization better, stand up in moist and salt air, require less care to keep them always bright and looking new, can be used until they are actually worn out in use.

**S. S. WHITE "TARNO" FORCEPS**

Before leaving our factory the handles and beaks of every pair of "Tarno" Forceps are made to endure stresses far beyond those encountered in actual use.

*for sale by your dealer*

**THE S.S.WHITE DENTAL MFG. CO.**
**211 South 12th Street, Philadelphia 5, Pa.**

"OVER A CENTURY OF SERVICE TO DENTISTRY"

# INSTRUMENTS

**. . . RUSTLESS**
**. . STAINLESS**
**CORRODIBLE**

S. S. WHITE "TARNO"
OPERATIVE INSTRUMENTS
Cone Socket Handles; Burnishers; Lecron, Frahm, Ward, Roach, and Vehe Carvers; Wedelstadt and S. S. White Chisels; McCall Curettes; Black's Cutting Instruments; Darby-Perry Excavators; Single and Double End Explorers; Bunting, Tompkins and Selden Bone Files; Black's Holding Instruments; Ladmore, S. S. White and Woodson Plastic Filling Instruments; Filling Porcelain Instruments; Black's Amalgam Pluggers; Hyatt Pluggers; S. S. White, Black's, Darby-Perry, McCall, Palmer, Thorpe, Zerfing, Odont Scalers; Cement Spatulas; Rhein Approximal and Darby Plastic Trimmers.

# EVERYBODY SMILE

- **A new dental health education booklet.**
- **Designed for supplementary classroom reading in the upper grades. Also suitable for the dental office reception room.**
- **Illustrated in four colors. Size about 7 by 9 inches. 36 pages.**

## EXPERT OPINIONS

"This new booklet, *Everybody Smile*, is the finest piece of health education material I have ever seen, and I mean in all fields of health." Hugo M. Kulstad, D.D.S., Chief, Bureau of Dental Health, California Department of Public Health

"Your new booklet, *Everybody Smile*, is an excellent piece of work. Its colorful art work and text capture the juvenile spirit and attention. I am making such material available to my young patients." Leo J. Shoeny, D.D.S., Chairman, Council on Dental Health, American Dental Association

"It is an attractive and appealing publication and should, I am certain, prove most helpful." Herold C. Hunt, Ed.D., General Superintendent of Schools, Chicago Board of Education

**— PRICES —**

| | |
|---|---|
| **25 copies . . . .** | **$ 6.50** |
| **50 copies . . . .** | **11.40** |
| **100 copies . . . .** | **19.50** |

**AMERICAN DENTAL ASSOCIATION**

**222 E. SUPERIOR ST. · CHICAGO 11, ILL.**

# YOUNG DENTISTS— Insure Your FUTURE SUCCESS

## BY 1 2 3 YEARS

### OF INTENSIVE PRACTICE!

*Young Dentists*—You will find no greater challenge to your new skills than the treatment and care of the million or more men and women in the U. S. Army and the U. S. Air Force.

Where else can you enter into a practice which promises you such a wealth of clinical material—provides you with the most modern equipment—offers you professional consultation services of the highest order. You may return to civilian life tremendously enriched by your experience.

Here, indeed, is the best place to start your career. In addition, you receive an original appointment as a first lieutenant, draw pay of over $5,000 a year (dental officers receive an additional $100 a month), travel to and from duty stations with family at government expense, receive free medical and dental care.

At any time during your tour, you may decide to make military dentistry your career. Regular appointments in both U. S. Army and U. S. Air Force are open to you.

*Write*
THE SURGEON GENERAL
UNITED STATES ARMY
OR
THE SURGEON GENERAL
UNITED STATES AIR FORCE
WASHINGTON 25, D. C.
*for full details*

**U. S. ARMY MEDICAL DEPARTMENT**
**U. S. AIR FORCE MEDICAL SERVICE**

# The dress that needn't have been so beautiful

THERE'S NO REAL REASON for a girl to have the most beautiful dress in the world. Even my daughter Sally. Even if she has her heart set on it.

But—I bought it. And when I paid the bill, I whistled! Partly with the well-known father's bill-shock. Partly for happiness. Because, Sally was right—there never *was* a prettier dress to get married in.

It's times like that—when we can buy something really important even if it *is* a luxury—that I feel *lucky!*

I know the luckiest day of my life was when I signed up to save regularly through the Payroll Savings Plan at the office. I'd tried every which way to save before, but, brother, this *automatic* way is the only way that *works—for you—all the time!*

**Buying U. S. Savings Bonds...** whether by the Payroll Savings Plan or the Bond-A-Month Plan . . . is the safest, "foolproofest," easiest method of saving since money was invented. And every $3 you invest will turn into $4 in just 10 years.

## Automatic saving is sure saving—
## U.S. Savings Bonds

*Contributed by this magazine in co-operation with the Magazine Publishers of America as a public service.*

"I always specify
VERNONITE
—it's false economy
not to use the best!"

Denture materials differ widely in quality, but *not* in price. As a matter of fact, the VERNONITE in a denture costs only pennies more than the cheapest acrylic that could be used to process your restorations. And yet Vernonite meets the highest standards ever set for an acrylic denture material. Vernonite is, and has been, the first choice of economy-wise dentists since 1937, when it was introduced to the profession.

True economy is not found in buying the cheapest material offered, but in obtaining the highest value. VERNONITE assures your patients lasting satisfaction and yourself unfaltering peace of mind. Ask your laboratory to process all of your restorations with Vernonite.

*Vernon-Benshoff Co., P. O. Box 1587, Pittsburgh 30, Pa.*

"Vernonite" Registered Trade Mark

# FLUORIDE THERAPY INFORMATION FOR THE PUBLIC

- **WHAT IS FLUORINE?**
- **HOW WAS IT DISCOVERED?**
- **HOW DOES IT PREVENT DECAY?**

## NOW!

Fluorine — Less Tooth Decay for Children

Catalog Number—G9

| | |
|---|---|
| Single copy | Free |
| 25 copies | $ .50 |
| 50 copies | .90 |
| 100 copies | 1.50 |

Shipping charges included

Ask for catalog of ADA dental health education material.

**AMERICAN DENTAL ASSOCIATION**
222 E. Superior St.
CHICAGO 11, ILL.

*Mosby Books* for *Dentists*

# Endodontia

A report on the problem of the pulpless tooth, presenting practical, clinical information. The authors have worked together for ten years at Baylor University and the results of their work show that there is a safe, scientific and indisputable treatment for the pulpless tooth. We consider it a signal service to the dental profession to present this valuable research at this time.

By BERNHARD GOTTLIEB, M.D., D.M.D., LL.D., SETH LEE BARRON, D.D.S., AND J. HOBSON CROOK, D.D.S., 188 pages, illustrated. **$6.00**

## BASIC PRINCIPLES AND TECHNICS FOR
# Complete Denture Construction

Beginning with the aims in artificial construction, the text covers materials and equipment, structures involved; principles of impression making; making of casts, jaw motions and their recording; principles in mounting casts on the articulator; principles of selecting anterior teeth; occlusion as a basis for selecting posterior teeth; principles of occlusion; principles of denture processing; principles of remodeling and rebasing; and immediate denture construction. It goes into minute detail and will serve as an excellent work guide on complete denture construction.

By VICTOR H. SEARS, D.D.S., 416 pages, illustrated. **$5.00**

# Review of Dentistry

Prepared with a threefold purpose, the book serves: first, as a concise, yet comprehensive, authoritative guide for those preparing for State and National Board Examinations; second, to fill the need for a general review book for the undergraduate student; and third, as a guide and ready reference for the busy practitioner.

Every chapter has been edited by an acknowledged authority on the particular subject he covers.

The book contains 4,950 questions and answers—twice as many as other Reviews available—and every chapter is an entirely new, up-to-the-minute piece of work.

Edited by: JAMES T. GINN, B.S., D.D.S. 824 pages. **$5.75**

---------- *ORDER FORM* ----------

ADA 7-50

**THE C. V. MOSBY COMPANY**
**3207 Washington Blvd.**
**St. Louis 3, Missouri**

Please send me:

- ☐ Gottlieb's ENDODONTIA—$6.00
- ☐ Sears COMPLETE DENTURE CONSTRUCTION—$5.00
- ☐ Ginn's REVIEW OF DENTISTRY—$5.75

____Enclosed find check. ____Charge my account.

Name_____

Address_____

THE fight is on to save more lives in 1950! Now is the time to back science to the hilt in its all out battle against cancer.

Last year, 67,000 men, women and children were rescued from cancer. Many more can be saved – if *you* resolve to save them–if *you* strike back at cancer. Give! Give your dimes, quarters, dollars. We need more treatment facilities, more skilled physicians, medical equipment and laboratories. The success of great research and educational programs depends on your support. Your contribution to the American Cancer Society helps guard your neighbor, yourself, your loved ones. This year, strike back at cancer...Give more than before...Give as generously as you can.

**AMERICAN CANCER SOCIETY**

# THE 1951 A. D. A. APPOINTMENT BOOK

## IS NOW AVAILABLE

If you aren't already on the standing order list, send in your order today.

**EXCLUSIVE FEATURES**

- ★ **A full week's appointments at a glance**
- ★ **Patient recall system**
- ★ **Catalog of library books**
- ★ **Catalog of dental health educational literature**
- ★ **National holidays**
- ★ **List of acceptable local anesthetics**
- ★ **List of certified dental materials**

***Use This Order Blank***

---

American Dental Association
222 E. Superior Street
Chicago 11, Illinois

*Check the order you wish to place:*

☐ Place my name on the standing order list to get the A.D.A. Appointment Book regularly each year beginning with the 1951 edition and bill me for $1.50. I understand this order is cancellable at any time.

☐ Just send me a copy of the 1951 book and bill me for $1.50.

Signed .....

..... No. Street

..... City Zone State

# INDEX TO ADVERTISEMENTS

## July 1950


Abbott Laboratories ..... A-8
American Cancer Society ..... A-56
American Dental Association .... 3rd Cover, A-15, A-22, A-23, A-34, A-38, A-42, A-44, A-50, A-54, A-57
Austenal Laboratories ..... A-6, A-7

Bard Parker Co., Inc. ..... A-21
Bristol Myers Co. ..... A-30

Caulk Co., The L. D. ..... A-28, A-29
Childs Mfg. Co. ..... A-37
Church & Dwight Co., Inc. ..... A-4
Classified Advertising ..... A-30, A-31, A-32
Coe Laboratories, Inc. ..... A-11
Columbus Dental Mfg. Co. ..... A-12
Colwell Publishing Co. ..... A-17
Cook-Waite Laboratories, Inc. .. A-40, A-41
Corega Chemical Co. ..... A-13
Crescent Dental Mfg. Co. ..... A-16

Dee Division, Handy & Harman ..... A-1
Dental Perfection Co. ..... A-10
Dentists' Supply Co. of N. Y. ..... A-2, A-3
Dentists' Supply Co. of N. Y. .... 2nd Cover
Dentists' Supply Co. of N. Y. .... 4th Cover
Durallium Products Corp. ..... A-26

Exakta Camera Co. ..... A-44

General Electric X-Ray Corp. ..... A-36

Housing Application (A.D.A.) .. A-24, A-25

Jelenko & Co., J. F. ..... A-16
Johnson & Johnson ..... A-14

Medical Protective Co. ..... A-16
Merck & Co. ..... A-39
Mosby Co., The C. V. ..... A-55
Moskey & Geiss ..... A-20
Myerson Tooth Corp. ..... A-5

National Dairy Council ..... A-9
Novocol Chemical Mfg. Co. ..... A-46
North American Phillips Co., Inc. ..... A-43

Parker Company, A. J. ..... A-17
Physicians Casualty & Health Assn. .... A-15

Reserve Plan, Inc. ..... A-27
Ritter Co. ..... A-45

Ticonium ..... A-35

Union Broach Co. ..... A-44
United States Army & Air Force ..... A-51
United States Saving Bonds ..... A-52

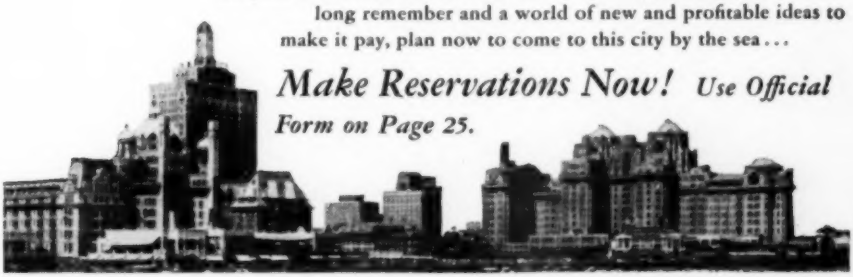
Vernon-Benshoff Co. ..... A-53

Wernet Dental Mfg. Co., ..... A-18, A-19
White Dental Mfg. Co., The S. S. A-48, A-49
Whitehall Pharmacal Co. ..... A-47

# "All Aboard" for the Boardwalk

## AND THE A.D.A.'s 91st ANNUAL SESSION

Along this famous boardwalk you'll stroll this Autumn, or roll in "baskets-on-wheels"... greeting friends, meeting with thousands of your colleagues at the A.D.A.'s 91st Annual Session. Here in Atlantic City, in the world's largest convention hall, you'll enjoy a program covering every phase of dentistry today—and highlighted by all that's new you want to know. Jot down these ideal dates: October 30th through November 2nd . . . days that are choice for warm sunshine salted by the ocean breeze, nights that are cool and starlit. Accommodations are plentiful, but it's well to file an early application for preferred locations. For a vacation you and your family will long remember and a world of new and profitable ideas to make it pay, plan now to come to this city by the sea . . .



***Make Reservations Now!*** ***Use Official Form on Page 25.***

# Attractive dentures build appreciative patients

A TRUBYTE NEW HUE DUPLICATE of this patient's natural teeth: Centrals — 1R. Laterals — 324. Cuspids — 1Y. Lowers — Mould 44. Shade 62 was an accurate match.

You create more attractive dentures whenever you use your Trubyte New Hue Mould Guide and your Trubyte New Hue Selector Assortment.

With your Trubyte New Hue Mould Guide you quickly observe the effect produced by using different moulds and arrangements of teeth and by interchanging laterals or cuspids from other moulds than the centrals. With your Trubyte New Hue Selector Assortment you choose the shade that is appropriate to the patient's age and complexion.

*For the best results all the time specify...*

**TRUBYTE NEW HUE®**

Also in Trubyte New Hue Forms and Shades

TRUBYTE ACRYLIC TEETH

THE DENTISTS' SUPPLY COMPANY OF NEW YORK